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PROGRESS.

(The Editor.)

It was an unkind stroke of Fate that gave to this season a light and delayed rainfall in many of the wheat-farming areas, just when the farmer most needed encouragement in his spirited efforts to make a record-breaking production. It is a consoling fact that despite this reverse the season's production will not fall far short of last year's harvest, and over 34,000,000 bushels are estimated. It speaks highly for the intelligence of the modern farmer that this result has been accomplished, as, in the circumstances, it only could be by the adoption of skilful husbandry and applied science in tillage. There was a time when the old type agriculturist turned a deaf ear to the admonitions of the scientist and shook his more or less hoary head with a sceptical smile when proferred counsel by those who made it their business to experiment for his benefit. The old methods were good enough for him. What applied to the experimental plot could not be applied to his broad acres. He was a practical man, and knew as did his father before him, that good and bad seasons there always would be; it was in the order of things ordained that there should be lean years and plenty years, and he must bow to the inevitable and take his annual gamble with the seasons. He had many virtues, this old farmer, not the least of which was his dogged perseverance—his indifference to the frowns of fortune. He was never quite down and out, was always up before the count, and his "come back" was continuous. When fortune favoured him with a good season he forgot all the bad, and enjoyed the success he reaped as a result of his labours. When fortune frowned he grumbled, but he did not sit down at his work. He fed his horses just the same, worked harder,

took up an extra hole in his belt and lived on hominy and pumpkin till he got a good harvest. Adversity could bend him, make his tongue sharper and his eye less bright, but it could neither humiliate nor break him. But there was one thing he would not and could not tolerate—advice as to how he should till his farm. We owe much to that lion-hearted type of settler, but apart from his pioneering work we have received but little benefit from his experience. Still he deserves well of our sympathy, for he carved out his destiny under conditions that would quell anything less than a dauntless heart. His means of communication were limited, and sparse newspapers were concerned more with representing to him the happenings of the outside world rather than devoting columns to the advancement that was taking place in cultivation and farm practice. Such enlightment as he received was spasmodic, and not always dependable or applicable to his own climate and environment. Little wonder that he viewed with suspicion new fangled notions about growing crops. Happily these conditions have changed for the better, and the modern farmer realises that the methods recommended by expert advisers are all to his advantage. Scepticism has disappeared, and is displaced by anxiety to learn the latest intelligence in respect to his vocation. The result is reflected in the harvest, for had the old-time stand-as-we-are policy maintained it is undoubtable that there would have been a considerable falling off in this year's wheat crop compared with that of the 1927-28 season. The results of the crop competitions and the experiments carried out at the experiment farms throughout the State, as published in this issue, afford valuable lessons to our readers. There is no need to be discouraged. Western Australia is blessed with a climate that is not variable to any great extent, and with a better season to come we may confidently expect a heavy increase in our centenary year yield. Farmers should redouble their efforts to bring this about. To those who have been unfortunate this season let the memory of that pluck and perseverance that characterised their antecedents inspire them to emulate the unwavering courage, bearing in mind that they can bring to their aid the knowledge diffused as a result of up-to-date experiment and practice. A man may work hard and accomplish little, but hard work when intelligently directed will perform wonders.

A NEW NOXIOUS WEED.

(*Berkheya carduiformis*, D.C.)

C. A. GARDNER,
Government Botanist.

This thistle-like plant, proclaimed a Noxious Weed for the State of Western Australia, is apparently confined to a small area in the vicinity of Hamelin Bay, at Karridale. It is a native of South Africa, and was probably introduced at Hamelin Jetty in the ballast carried by timber boats. Since these boats have not called since 1914, it is fairly safe to assume that the plant has been established here for at least fourteen years.

Mr. G. Gauntlett, an Agricultural Adviser attached to the Dairy Branch of the Department of Agriculture, in reporting upon the condition of this weed, states that the area covered by the plant is about one and three-quarter miles in length by about 300 yards in breadth. It is growing in the sand dunes, and appears to prefer sheltered places although, at the same time, growing in open situations. Two plants seen by Mr. Gauntlett growing in close proximity were twenty-four feet in circumference. The plants are said to be advancing inland at the rate of about half a mile per year. Fire appears to keep the weed in check, since where timber stacks had been burned some years ago, no thistles were found.

Berkheya carduiformis, as far as can be ascertained, is not a gregarious plant in its own country, and has not been previously recorded as naturalised in any other country, or State of Australia. The plant resembles a thistle, particularly the Star Thistle, and is quite as forbidding by reason of the sharp spines of the leaves and flower heads. In addition to spreading by means of seeds, the plant spreads vegetatively. The older stems in time become bent, and where they come in contact with the soil they root and give rise to new plants. In this way, it is possible for one plant to cover quite extensive areas in the course of time. Each plant, therefore, if allowed to develop, becomes a colony, the whole forming a densely matted intricate mass.

Fortunately, the weed has appeared in one locality only, so that it will be possible to keep a close watch over it, and completely eradicate it. At the same time, there is the possibility that seeds may have been carried by various agencies, and if so, when recognised, the plants should be instantly destroyed, since we have in this plant a species which, if left to itself, may, with a suitable environment, spread to an alarming degree. The plant has been grown in Perth for two years, and has successfully withstood the dry summer in poor sandy soil.

Description of the Plant.

A thistle-like plant, 2-3 feet in height, and up to six feet in diameter, with several erect or spreading stems, which sometimes develop into stolons. Leaves rigid, pinnatipartite, the lobes terminating in strong pungent spines, often with smaller spines between, the margins recurved; the radical leaves very long, tapering at the base and subsessile, the stem leaves shorter, the uppermost very short and decurrent in spiny stem-wings. Heads small, dis-

coid, subcorymbose or panicled; the peduncles and bases of the involucres woolly. Involucre of spiny-toothed bracts with recurved margins. Receptacle honeycombed, the cells with rather long bristles. Florets yellow; filaments smooth; achenes glabrous, obconic, crowned by a pappus consisting of a short cup irregularly split. Flowering season November-December. The

Berkheya (*Carduiformis*, D.C.).

achenes are small and black when mature. They do not readily fall out of the involucre, but remain in the pockets of the honeycombed disc. After the achenes mature, the whole involucre falls from the plant. Its spiny nature renders it easily picked up by animals in passing, and the achenes fall out as the involucre is carried or rolled. Unlike many plants of the same family the seeds are not distributed by wind.

Berkheya cardui formis, D.C.

Explanation of Plate.

A. Habit of Plant—½ natural size.

B. Upper leaf—natural size.

C. Involucre—natural size.

D. Floret—twice natural size.

E. Achene ("Seed")—twice natural size.

THE EARLY VARIETIES OF SUBTERRANEAN CLOVER.

By A. B. ADAMS, B.Sc. (Ag.).

(Four varieties of Subterranean Clover are known. These are First Early, Second Early, Mid-Season and Late. The writer deals with the first two.)

In the article on Subterranean Clover "Journal of Agriculture, W.A." (Vol. 4, page 524) a second early variety found at Muresk is mentioned, but it is stated that nothing is known of its origin. Examination and comparison show that this form is identical with that grown by Mr. Monger at "Daliak." Mr. Cotton has since stated that Mr. Monger supplied him with two bags of clover burr in 1921. It is therefore established that the early variety found at Muresk originated at "Daliak": beyond this its origin cannot be traced. All that is known is that it appeared at "Daliak" and, being suited to the district, spread over the greater part of the property. Sheep have been the chief agents in spreading the seed, but topdressing has given the vigorous growth and luxuriant pastures.

At Muresk we have both the early varieties, viz., the first early from Mr. P. D. Forrest of Boyup Brook and the second early from Mr. A. J. Monger of York. As they are growing under similar conditions it is possible to draw comparisons. The following table sets out the effect of seasonal conditions:—

Year.	First Early.	Second Early.
1927, with first effective rains on May 6.	Flowered August 13.	Flowered last week in August.
1928, with first effective rains on May 29.	Flowered August 20.	Flowered first week in September

It will be seen that seasonal conditions affect the time of commencement of flowering.

The time when the plants cease to flower appears to be chiefly controlled by the soil moisture. On November 12th the first early plants were still growing and flowering where the soil was moist: but where the soil was dry the plants had withered. Nevertheless it would appear that there is a definite date for the cessation of growth because by the end of the first week in December even the plants on moist soil had dried up.

In addition to the points of difference previously recorded between the first early and mid-season varieties there is a further difference in seeding habits. If the ground is dry the plants of either variety fail to bury their seed. If, however, the ground is shaded by the leaves of the plants the mid-season will set seed in the burrs lying on the surface. These surface seeds are as large and as well developed as those in the buried burrs. The early varieties form little seed on the surface although while the ground is still moist they flower and seed prolifically. It is essential in these varieties that the flowers must be able to bury themselves.

Since the early varieties form a negligible amount of seed on the surface it is to be expected that their seed will be rather more expensive than the mid-season. It is necessary to scratch the seed from the ground with a cultivator before they can be swept up. It must not be inferred that the seeds of

the early varieties will not be available to stock, as Mr. Monger states that his sheep scratch the burrs out of the ground and feed on them. The sheep digest much of this seed but not all. It is the undigested seed which is largely responsible for spreading the clover over "Daliak." At Muresk much the same thing has happened, for the swept burr received from Mr. Monger was sown in the railway paddock. At the present time plants of this variety are found at the opposite end of the farm.

Although it is a fact that sheep utilise much of the seed, passing a small percentage in the droppings in an undigested condition, and these seeds that have resisted the digestive action of the animal are a means of spreading the plant into fresh areas, it must not be thought that it is safe to stock a young subterranean clover pasture heavily with sheep.

Probably many failures to establish such pastures, or a long delay in obtaining a satisfactory one, are directly due to overstocking with sheep in the first year or two after sowing. To overstock, even with cattle, is a bad practice, but sheep bite so closely that they are able to nip off the comparatively large seed leaves of Subterranean Clover and so kill the seedling.

Whenever an attempt is made to establish annual plants as a pasture it is advisable to graze very lightly if at all in the first season in order to produce as much seed as possible. With subterranean clover this is very profitable and necessary as the plants are able to send out long runners and bury their seed well away from the parent plant. This helps to fill up the bare places.

One reason that this plant has been so successful is because it is aggressive, that is, able to grow among other plants given suitable conditions as to soil and climate, and not only live but thrive and seed prolifically and eventually become the dominant species.

Experience this year confirms the previous idea that it is no kindness to subterranean clover to sow it on an absolutely clean seed bed. Seed of the first early variety was sown with an oat crop and also on a two-year-old stubble containing crowfoot (Erodium), several of the smaller trefoils, with Brome and other grasses.

The oats were very clean of weeds and the long runners of the clover were unable to obtain the amount of shelter that they like. The surface soil dried to form a thin crust and the burrs were unable to pull themselves into the ground, consequently but little seed was formed, and probably most of the plants that grow this coming season will be from hard-shelled seeds that failed to germinate last year.

Where the seed was sown on the stubble the superphosphate with which the seed was mixed caused a luxuriant growth of the herbage mentioned above. Where this growth was thickest was the best stand of Subterranean which took advantage of the congenial shelter and buried much seed. This was due to the shade retaining moisture at the surface and perhaps also partly due to the shade itself being congenial. It is of course possible to overdo the amount of shade; it would not be well to sow seed where a heavy smothering growth of Capeweed was expected; a stand of trefoils, however, is a help rather than a hindrance. In sowing the seed for the first time it should be realised that some shelter is of great help to the young seedling and that the flowering plant is able to set more seed if the ground is shaded.

It cannot be too strongly emphasised that the most profitable treatment of a first year's growth is to keep all stock off until the plants have seeded and died down. And for the second season stock lightly, keeping all stock off until the plants have made strong growth.

Summary.

1. The second early variety of subterranean clover found at Muresk is identical with that grown by Mr. A. J. Monger at "Daliak."
2. The time of commencement of flowering varies with the season, or rather with the time of the first useful rains.
3. Flowering is continuous from its commencement to the time when the soil dries out.
4. Practically all the seeds of the first and second early varieties are buried. Flowers unable to bury themselves do not develop seed satisfactorily. In this way the early varieties differ from the mid-season variety which forms seed on the surface if shaded sufficiently.
5. The early varieties set seed better when the ground is shaded. They should be sown with a good nurse crop or on an existing pasture of trefoil or annual grasses.

CULTIVATION OF ONIONS.

E. T. MORGAN,
Vegetable Inspector.

For the greater portion of the year Western Australia relies on the Eastern States for her supplies of onions. During the months of June, July and August of this year (1928) practically the whole of the requirements of this State were supplied from this source. The quantity imported for 11 months was 2,304 tons, and the value at the port of shipment was £25,165. During the three months mentioned above the local prices soared to £20 and £30 per ton. It will, therefore, be seen that the local demand is great enough to warrant much more extensive planting of this very necessary vegetable.

The onion is believed to have been one of the earliest plants cultivated by man. It was produced so early in the history of the human race that the time and place of its first use are not known. Its immediate wild ancestor has never been discovered with certainty; but whatever its origin the fact remains that it was cultivated in the dim past over a vast area in Southern Asia, and in the Valley of the Nile. The onion is now grown in every civilised country and constitutes a very important article of food.

The plant is easy of cultivation, and is one of the most profitable crops that can be grown. Another point in its favour is that, unlike most other crops, it does not exhaust the soil or require that the land be rested at intervals, but yields heavy crops year after year.

Soil.—The ideal soil for onion culture is undoubtedly a good loam, but there is, perhaps, no crop grown which adapts itself to difference of soils and climates as does the union. It has been, and is, grown profitably in soils ranging from light sand to heavy clay. In fact, some of the best keeping onions are grown in the heavier land, the great drawback being in the cultivation of such soils, as at certain periods of the year this class of land gets waterlogged and in this state it is nearly impossible to get it into suitable condition for the reception of onion plants Under irrigation, in the light sandy soils of Coogee and Spearwood, crops of up to 20 tons per acre are grown every year, while, relying on the natural rainfall, profitable crops are grown in the South-West from Albany to Geraldton in various classes of soil. In the peaty swamps at Osborne Park heavy crops are obtained, while in the potato-growing areas around Capel, Burekup, Benger and Brunswick small plots have yielded excellently. Messrs. Higgins Bros., the well-known onion growers of Capel, during the 1919 season harvested the phenomenal yield of 43 tons from 1½ acres. Mr. F. Simper, at Beaconsfield, has just finished harvesting a crop which yielded 28 tons per acre. This remarkable crop was grown in a very light sandy soil thoroughly enriched with artificial manures and decayed vegetable matter. Yields like these give the onion grower a goal at which to aim, and undoubtedly the area at present planted can be greatly enlarged with profit both to the grower and the State.

Preparation of Seed-Bed.—The method generally adopteed in Western Australia is to sow the seed in a well prepared seed-bed, and when the plants are from 4 to 6 inches high, to transplant into the field. The preparation of the seed-bed is one of the main essentials of onion culture. Onion seeds are rather small, and hence require a finely pulverised, moist and well compacted seed-bed. The land should be dug as deeply as possible, say, from 9 to 12 inches. If the surface soil overlies a heavy clay, it is inadvisable to bring this to the surface, at least in one operation. A rake can be used to bring the soil into a fine tilth, and the back of the rake drawn rather heavily over it or firmed with the back of a spade will bring it into good condition for the sowing of the onion seeds. Artificial manure can be incorporated with the soil during the digging operation. A good dressing of fertiliser on the top prior to digging, and dug in with a lighter dressing before raking, brings the bed into a satisfactory condition. A suitable manure would be "No. 4" or "E" brand of potato manure, as put up by the local manure works. If obtainable, a dressing of stable manure is desirable, but it must be well rotted, or weeds will be rather troublesome. Make the beds about 6 feet wide, as this width allows hoeing, for the control of weeds, from each side, and does away with the necessity for treading on the bed during weeding operations. Seed should be sown in drills rather than broadcast, as this allows the working of a small hoe in between the plants. A good plan is to make a rake-like structure, with picket-shaped "tynes" spaced about 6 inches apart, which, when drawn lightly through the soil, leaves six or eight small channels ready for the sowing of the seed. Onion seed is comparatively slow germinating, and it is not advisable to plant deeply: if the land is sufficiently moist, the lighter the covering of soil the better the germination.

Selection of Seed.—It is most essential to obtain fresh, reliable seed true to name. Onion seed loses its vitality very quickly, and none older than last season's crop should be procured. Many experienced growers invariably save their own seed, as by selection and judicious cultivation through a series of years it is possible to raise the standard of excellence. I have often heard it said that we cannot grow onions to compare with those grown in the Eastern States, but I have seen some locally grown that compare very favourably with the imported article. I am convinced that if growers would be more careful in the selection of bulbs planted for seed we should soon have a much higher quality onion. Many growers, saving bulbs for planting in order to obtain seed, pick out nice even-shaped and not too large onions. This is quite right, but too little attention is paid to the texture of the skin. Of, perhaps, six onions, similar in size and shape, four may be fairly loose skinned, and the other two may have a large number of very fine, tough skins, closely packed. This, in my opinion, is the type of onion which is desirable to plant for the production of seed. The practice of propagating from the best is sound in all instances of vegetable culture. It is the fine, toughly packed skinned onion which is the best keeper, and I am sure if growers will work along these lines they should have no cause to complain of either the quality or quantity of their crop.

The bulbs saved should be planted out in rows about 3 feet apart. It is advisable to place a stake to each bulb to secure the seed-heads from being blown and knocked about and probably broken by the wind. If the season is favourable—that is, warm and dry—a fair amount of well-ripened seed should be obtained.

Promptness in harvesting is essential, for, if delayed too long, the seed receptacles open, and part of the seed will be lost in handling. When the tops have turned yellow, remove them with about 6 inches of stem and place them in strong paper bags and hang them up in a well-ventilated place to dry. Frequent turning will hasten the drying process, and most of the seed will drop out in the operation. Any seed remaining can be beaten out with a flail or stick; and in the case of a small quantity, rubbing between the hands will satisfactorily extract the seed. It can be cleaned by winnowing. The seed should be stored in a well-ventilated place, free from excessive moisture.

In other cases it may be possible to secure the seed from a neighbouring grower whose stock is known to be good and suited to the district. Where this is not convenient or possible the seed can be obtained from a reliable seedsman. Mixed sorts should be avoided in order that one part of the crop will not ripen before the remainder.

(In the next issue of the Journal further phases of onion culture will be dealt with.)

THE INDUSTRIAL ASPECTS OF ANGORA RABBIT WOOL FARMING.

C. J. Craig.

At the time of writing the Angora is the most valuable rabbit in the world. Developed in France for its wool clip, it has, since the war, been greatly improved by the clever breeders of France and Great Britain, until to-day its wool yield exceeds in value that of an average sheep, which costs ten times as much to maintain.

WOOL YIELDS OF THE IMPROVED ANGORA.

The annual wool clip of a good Angora rabbit is worth £1 per year.

One may put the average annual wool yield of a properly bred and fed Angora rabbit at 10 ounces per annum. The British spinners who deal with this valuable fibre are to-day paying 36s. per pound.

WHERE DO WE SELL OUR WOOL?

One is nervous, especially in far-away Australia and New Zealand, over the finding of a market. Do we have to send our little boxfuls or bales to the local auction sales, where the thousands of tons of sheep's wool are annually auctioned? Or must we perform that intricate operation known as exporting? Well, all our qualms can depart. A whole hundredweight of Angora wool can be packed in a small case or bale and consigned at ordinary space rates direct to the British mills. As such a consignment would be worth about £200, it is apparent that the cost and trouble of marketing are insignificant.

The principal (or only) British buyers of Angora rabbit wool to-day are The Derwent Mills, Ltd., Matlock, Derbyshire, and it will be quite a simple matter to send them the New Zealand and Australian production.

The Industrial Rabbit Club of New Zealand, which will probably extend to Australia, will organise a system to collect and market the wool of its members, and do many other things to help the industry.

WHAT IS THE RABBIT CLIMATE?

In France the cold regions are appreciated as tending to denseness of wool. Yet housing is designed to protect from cold. In Britain, where there is no law against indiscriminate farming of rabbits in the open, the Angoras are comfortably housed. Where open-air housing is practised, the discomfort of working in the rain is recognised. The French rabbits have a long, loose fleece; the British a more dense fleece. All the evidence seems to suggest that the breeder is more potent than climate. Fleece weight can be bred in any reasonable climate, and the long dry spells of Australia, coupled with the productiveness in fodder cropping of both Australia and New Zealand, are assets of great importance. As we increase the density and weight of the fleece, we must shear oftener for the rabbit's comfort. Virtue, it seems, has its price.

USES OF ANGORA RABBIT WOOL.

The extraordinary fineness and softness of Angora rabbit wool defy imitation from other sources. Underwear is its principal destination. But men's felt hats of high quality and men's unders also call for increasing

quantities. A union of wool and silk is in great request, and milliners' flowers, dress goods, pads, and ladies' stockings may yet absorb a great tonnage. New uses are continually being added to the list, and old uses extended. Wherever warmth, lightness and softness of touch are desired, there the Angora rabbit fleece is indispensable. The spun yarn of Angora rabbit wool is retailed at about 4/- per ounce, or about £3 per pound. It is washable.

THE LAW ON RABBIT KEEPING.

The law in Australia and New Zealand, up to April, 1928, has prohibited the importation and farming of rabbits. This has deprived the local breeders of the magnificent strains developed in Britain, and throws them back upon the local strains, giving only about one-third of their wool-yield. Unless the law be revoked, or adequate importations be permitted by Order-in-Council, the local breeders will experience years of disheartening struggle to develop a profitable strain. Now, however, New Zealand admits them, and the N.S.W. law has been relaxed.

ANGORAS CANNOT CREATE A RABBIT PEST.

The idea that the industry would increase the wild rabbit pest is ridiculous. There are five sufficient reasons against such a result, in addition to the fact that Angora rabbits have been freely kept as pets for many years without being a nuisance.

(1) The improved Angora rabbit (worth at least £1) is too valuable to be set loose.
(2) It is too tame and too slow to run away from danger.
(3) It is white, and therefore, doomed, immediately it encounters a boy, a dog, a gunman, or a hawk.
(4) With its long, ungainly wool to clog with dirt, this helpless manufactured creature is quite unfitted to the dirty conditions of the burrows.
(5) If it did interbreed with the wild rabbit, the resultant cross would not be fitted to withstand rough conditions, and would therefore be easily controlled.

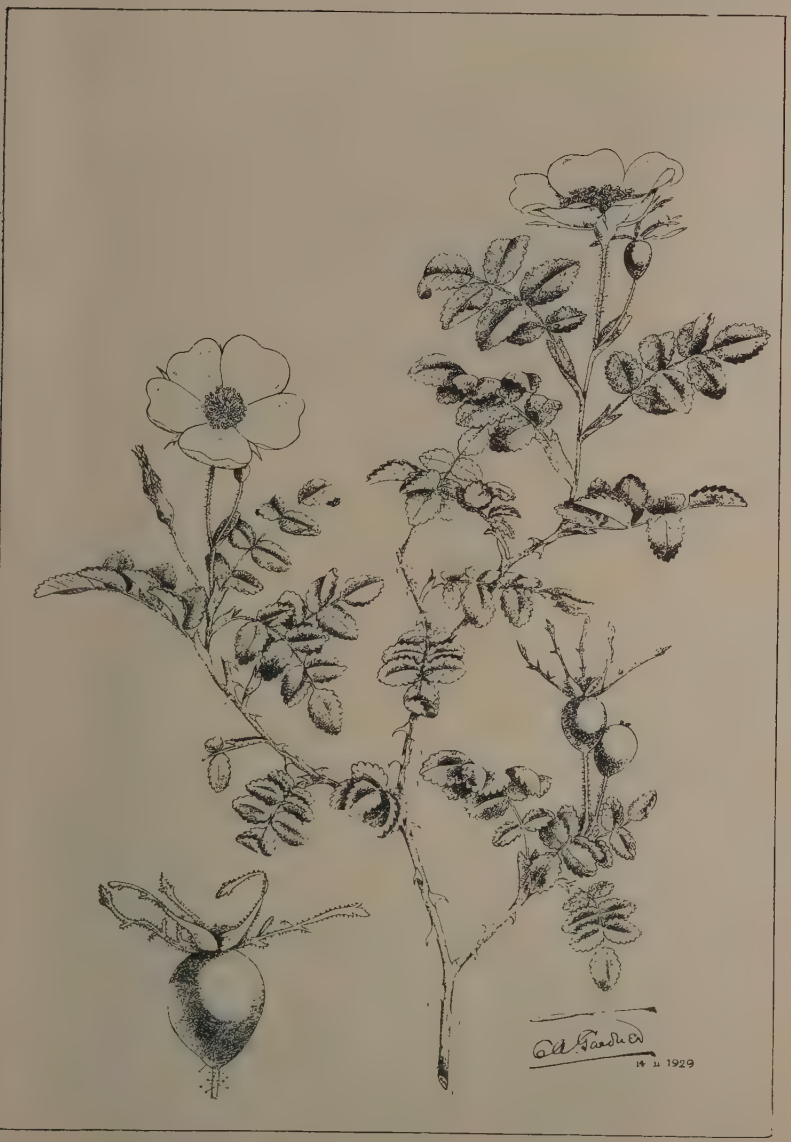
SWEETBRIAR.

(*Rosa rubiginosa*, Linn.)

C. A. Gardner,
Government Botanist.

This well-known European plant has been established in Western Australia for many years, and since it is of ornamental value and used for stocks for cultivated roses there is little doubt that its introduction was intentional. It is, however, not a common naturalised plant, and is perhaps most prolific around Bridgetown where it enhances the beauty of the roadsides in the red loamy soil, its flowers making these places reminiscent of British hedgerows in the early summer, the scarlet fruits following in January and February.

Sweetbriar is a proclaimed weed in Queensland, New South Wales and Victoria, and it is also included in the Commonwealth List. The plant also occurs in South Australia and New Zealand, and doubtless also in Tasmania. It is a gazetted noxious weed for the State of Western Australia. In this State, however, it is only in the lower south-west that the



Sweebriar Rose (*Rosa rubiginosa*, Linn.).

plant may be expected to be troublesome. At Bridgetown it has not spread to any appreciable extent in twenty years. It is not expected that it will prove of any consequence to the north of Bridgetown. On the other hand, the plant may become troublesome in the Karri country where a higher rainfall is experienced. In localities such as the Frankland River district and Augusta, Sweetbriar may, if established, demand prompt remedial measures, but at present the plant where established has proved of no consequence from an economic standpoint.

Eradication is best effected by pulling out the plants when the soil is moist. Frequent cutting down, however, should in time weaken the plant and result in death.

Description of Plant.

A shrub of 10-15 feet with several more or less erect stems, spreading by means of suckers. Stems and branches armed with stout hooked prickles. Leaves deciduous, consisting of five to seven leaflets, ovate to lanceolate in outline, serrate, the teeth again toothed, glandular-hairy underneath with rust-coloured hairs, which upon bruising emit the fragance for which the plant is noted. Flowers pink, one to three together, on stalks which are beset with prickles or glandular hairs. Sepals pinnately lobed and glandular-hairy. Fruits scarlet when ripe, usually obovoid, but varying from ovoid to oblong. Flowering period October to December. Indigenous to Europe.

For further particulars see plate.

BEE DISEASES.

PREVENTION AND CURE.

H. WILLOUGHBY LANCE,
Apiculturist.

Firstly let us ascertain the principal diseases that are known to exist, and their symptoms, then deal with general preventative hygiene, and lastly how to treat those diseases which are prevalent in Western Australia.

The disease, which has caused the greatest damage and loss to the industry of recent years, is probably that originally known as "Isle of Wight" disease, and which, after many years of study, is now found to be two separate diseases. The first to be discovered was named "Nosema," and the last, which was the real cause of all the destruction, named "Acarine."

"Isle of Wight" Disease was first noticed in this small island on the south of England in 1904, and shortly afterwards appeared on the mainland and then spread very rapidly, wiping out whole apiaries.

After some years of research, it was discovered that most of the dead bees had a protogan mite in the alimentary canal, and this was put down as the cause and named Nosema apis. Further study, however, revealed that this was not the cause of the trouble. The cause was discovered in 1921 by Dr. Rennie to be a mite of the Tarsonemus family, and was named Woodi. The disease itself was named "Acarine." Instead of Isle of Wight disease, therefore, we now have Nosema Disease and Acarine Disease.

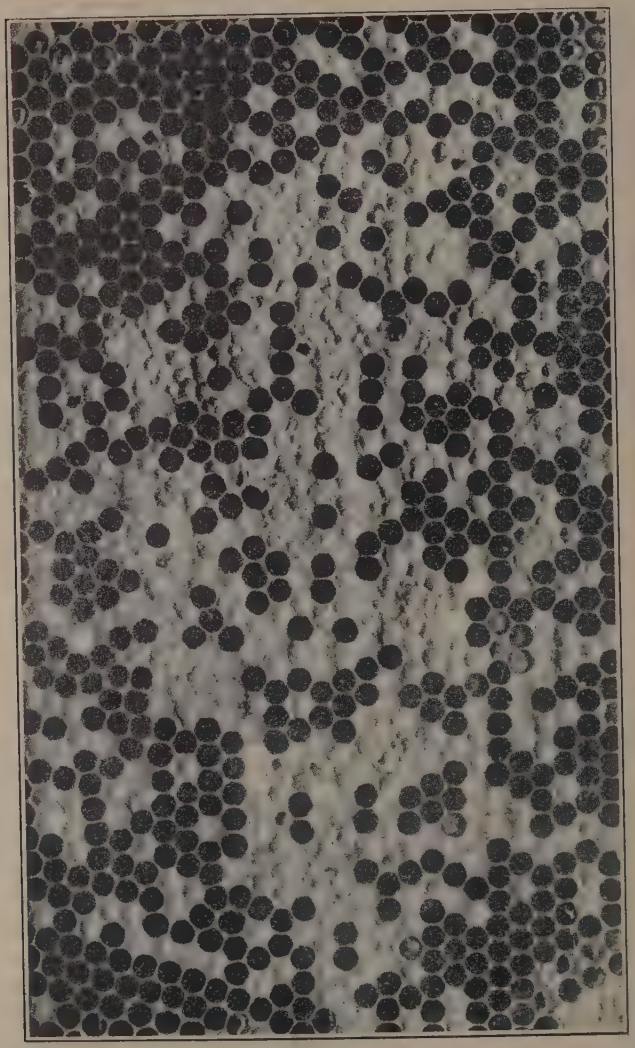
Nosema Disease is known to exist in Great Britain and most South European countries, America and New Zealand. So far, however, it has not been reported in Australia.

It is insidious, and often is spread through the apiary before the Beekeeper is aware of its presence. The water supply of the apiary is considered to be the chief means of infection.

It usually appears in the spring, the colony dwindling down when there is plenty of brood, and often crawling bees, unable to fly, are noticed. It is, therefore, sometimes mistaken for paralysis. Miscroscopical examination is the only sure means of detection.

Acarine Disease.—The most serious of those affecting Adult Bees. It is found in the British Isles, Switzerland, Germany and parts of France. The causation agent is Tarsonemus Woodi, which invades the respiratory organs of the bee and breeds there. The disease is spread by the contact of healthy bees with those suffering from the disease; the parasites when overcrowded in the sick bee, migrate and seek new living and breeding grounds. Crawling of the bees in large numbers, nearly always away from the hive, with wings in a peculiar position as though dislocated, or with efforts to fly, is the most noticeable symptom. The bees often clustering at the entrance to the hive with the noticeable peculiar position of wings before crawling away. Dysentry and enlargement of the abdomen are also symptoms.

Foul Brood is now divided into two diseases named European and American. The original type was first observed in Europe and it was not for many years that a variety was observed in America and found to be quite distinct.



American Foul Brood (Bacillus larvae) in an advanced stage. Note the patchiness of the brood and the sunken cappings. The few white spots and raised cappings are healthy brood.

European Foul Brood.—Sometimes called Black Brood in America. Although this may appear at any time, it is usually more prevalent in the Spring when the colonies are least prosperous.

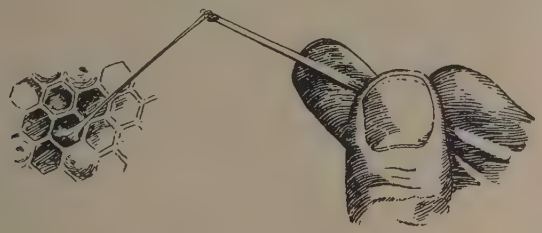
The causative agent is Bacillus pluton, which attacks the brood in the larval stage. It usually proves fatal before the cells are capped over, but in

advanced cases, some dead brood may be found in capped cells. There are sometimes secondary agents associated with the disease, B. alvei and S. apis, which cause a variation in the decomposition of the larvae and cause it to be mistaken for American.

The dead larvae first of all appears as a rotten mass, at first slightly yellow, then a dark brown and finally black in the cell, and afterwards dries to a semi-plastic mass and later to a scale slightly adherent to the cell wall, which can be removed by the bees.

There is sometimes a slightly sour or fermenting odour. If a match or chip of wood is inserted into the cell, the rotten mass may adhere to it, but will not pull out any length as does American Foul Brood.

American Foul Brood is undoubtedly the worst disease that the Australian and New Zealand Beekeeper has to combat, as it is more insidious and may lie dormant in old combs and honey for several years. It does not appear that any country, where commercial beekeeping has been in existence for any length of time, is free from it.



One test for American Foul Brood.
Note how the diseased larvae draws out.
(Photo. from U.S.A. Dept. of Agric., Bulletin No. 442.)

In some parts of America, and New Zealand, it has caused the loss of thousands of pounds worth of stock. In spite of much better inspection in New Zealand than in Australia, it has got such a hold that, under the Apiaries Act, no one is allowed to move any bees whatever, whether they are in a diseased district or not, without notice to the Apicultural Department. American Foul Brood may frequently be detected by the smell coming from the entrance to the hive, or upon lifting the cover, the odour being like that of an old glue pot being warmed up on the stove.

It is caused by Bacillus larvae, the brood usually dying after capping has taken place, the cappings having a dark brown colour, with a shrunken instead of raised appearance and many of them have pin holes in the centre. American Foul Brood appears at any time that breeding is taking place, but European nearly always in the Spring. If a splinter of wood is thrust into the cell and withdrawn, a sticky mass of a brown or coffee and milk colour, will adhere to it and upon withdrawing same, will string out to half an inch or more and then break and fly back like elastic.

After a while these rotten masses dry up into a dark brown tongue like scale, adhering firmly to the bottom edge of the cell. These contain the spores of future generations, being patchy and scattered all over the comb.

This is the most dangerous condition, as it is not easily detected and may lie dormant for several years, until suitable conditions arise for germination.

Spores kept in a laboratory for over 3 years have been cultivated and produced the active form of the disease. The best way to detect these spores is to hold the comb at an angle so that the light falls on the lower cell walls, when the tongue-like mass will be seen at the edge.

Sac-Brood, Sour-Brood, and "Pickled Brood" according to different writers, appears to be the same disease. The chitine or skin of the dead larvae does not disappear as in Foul Brood, but toughens so that the remains may easily be removed from the cell. The contents are watery and granular in appearance with a strong acid smell resembling vinegar. The colour is usually yellow, darkening to brown, but it is sometimes of a greyish colour. In drying, the surface becomes wrinkled, finally nothing remains but a "scale" which does not adhere to the cell wall. Streptococus Apis is considered to be the cause of Sour Brood.

Chilled Brood is not really a disease, but is caused by snaps of cold weather after good breeding weather with Honey and Pollen coming in, causing Queen to lay rapidly. Then during the cold weather, there not being sufficient bees to cover the brood, they die of cold, or it may be caused by bee-keepers opening and exposing the brood on a cold day.

The appearance of the dead larvae is usually of a greyish nature, not yellow or brown and the skin is distinguishable, not rotten like foul brood.

Dysentry is a disease of the adult bees. The usual signs being that the bees discharge their excrement over their combs and hive, just wherever they happen to be, the faeces being dark and muddy in appearance with a peculiar offensive smell, the bees are weak, slow in movement, and decrease unusually fast.

It is caused by unsuitable food, poor quality, watery, or fermented honey or syrup made from impure sugar. The disease usually appears after the bees have been confined to the hive for a long period owing to inclement weather.

Paralysis.—In this disease the bees are noticed to have swollen abdomens, and are seen crawling from the hive shaking and trembling, many becoming black and shiny. Very often healthy bees may be seen dragging the diseased ones away from the hive and in a little time the hive becomes very weak.

There is no definite information as to the cause of this disease, but T. W. Cowen in the British Beekeeper's Guide Book, refers to an undetermined disease, which apparently corresponds with what we know as paralysis. He states that it is caused by a micro-organism termed Mucor melittaphthorus. In 1881 Drs. Bermernan and Hubner found spores of Mucor micedo among the fat corpuscles of the abdomen, in some cases so thickly as to prevent the circulation of air for distension of the air sac, thus making the bees unable to fly. Spores were also found in the lower portion of the abdomen causing abdominal distension.

Bee paralysis seems to be more virulent in hot rather than cold climates. also some strains of bees are more immune to it than others. F. W. Buehne considers that he has it well under control by developing and propagating a strain of vigorous leather Italians. He does not find the yellow strains so resistant. Paralysis is not transmitted by brood or combs but by dead or sick bees.

Dr. C. E. Burnside, of the Bee Culture Laboratory of the United States of America, has recently been studying sick and dying bees, showing symptoms of paralysis, and has found in the blood of these bees a heretofore unrecognised organism Bacillus apisticus, which he considers to be the cause of the trouble.

He found the disease to be worse in damp places, and suggests well-drained apiary sites exposed to direct sunlight as being helpful to prevent the trouble.

Spring Dwindling is not a disease but is a trouble that has caused a lot of discussion at times. The symptoms are that in the Spring, certain hives although they appear to be healthy with a good Queen, do not build up but dwindle in strength and frequently a large number of dead bees are seen lying about.

The cause, in some cases, is that the colonies have wintered with mostly old bees and that very little breeding has taken place during the Winter. Then a spell of fine weather comes on with honey and pollen coming in and the old bees working their hardest die off before sufficient young brood has been hatched and are fit to take their places.

May Disease, is a spring disease known in Europe and America, and in some cases may be the cause of so-called Spring dwindling. This, however, can only be ascertained by scientific investigation, for which, unfortunately, there are practically no facilities in this country.

Dr. L. Lardinois of Belgium attributes the disease to a ferment, saccharomyees (mykes, mushroom) which infest the body of the bee; this ferment is also found in honey and pollen. The usual symptoms are that the adult bee loses its hair and cannot discharge its faeces. During the summer the colony does not show much infection, but in the winter when breeding is restricted it becomes a menace to the colony. The Queen is not immune and may easily cause a colony to become queenless in early Spring.

Cold weather, fermented or watery honey, badly ventilated, or too large a hive may bring about this disease.

Bee-Louse.—Probably most Bee-keepers are not aware of the existence of this parasite, as it is seldom referred to in Australian publications. The Bee-louse, Braula cocca, attaches itself to the head of the bee, feeding on honey, which by various irritating methods, it induces the bee to exude from its mouth. It is not a serious menace, but in serious cases of infestation of weak colonies, weakens the stamina of the bees, making them more liable to the attacks of disease.

Having briefly described the principal diseases, I will now deal with the most important subject.

PREVENTION.

Disease is caused by parasitic organisms such as living parasites, bacteria, fungi and moulds, when the complaints are infectious, or by unnatural conditions such as excessive cold or moisture, bad ventilation, unsuitable food, these being non-infectious.

Bees need to be studied and cared for, if Bee-keepers would make a success of their calling or hobby.

Firstly, good weather-proof hives of approved design.

Secondly, strong colonies headed by a good Queen preferably Italian, as this race resist disease much better than the Black German.

Thirdly, cleanliness.

Fourthly, knowledge of the normal healthy symptoms of bee-life and being on the alert at the first appearance of anything abnormal.

The question of Hives is too lengthy to be dealt with here. I would, however, warn Bee-keepers against using second-hand hives without ascertaining that they are not second-hand because the bees have died of disease. But under any circumstances, they should be thoroughly disinfected. If purchasing from an unknown person or district, he should communicate with the Agricultural Department as it might save him much trouble and loss.

Dealing with Cleanliness. All hives should be cleaned once a year. A number of hives should be prepared during the Winter and when the bee-keeper makes his Spring examination the colonies should be transferred to these. The old hives should then be thoroughly cleansed and scrubbed with a disinfectant. Some use a solution of Calverts No. 5 Carbolic but the disinfectant largely used by bee-keepers in Great Britain is Izal. The strength being 1 part Izal to 300 of water. Izal is a non-poisonous antiseptic, not objected to by the bees.

Floor boards should not be fixed to the body of the hive as they are so much more difficult to clean properly.

If the floor board is loose, it is an easy matter to cleanse at any time in addition to the annual cleaning, by lifting the body on one side and scraping away any refuse.

In cases where the Apiarist supplies water for his bees, it is advisable to add a little Izal to this, especially if he suspects that there is any disease in the neighbourhood. The Izal will act as an Antiseptic, the solution being 1 in 300. If feeding has to be resorted to, 1 oz. of Izal to 80 lbs. of Sugar and 6 gallons of water is recommended as a good antiseptic.

Fourthly the Bee-keeper should make himself familiar with the early symptoms of the various diseases, so that he may take prompt measures to deal with same. If in doubt, he should communicate at once with the Agricultural Department.

There is one cause of infection over which the Apiarist unfortunately, has no control. That is from empty honey containers thrown out on the rubbish heap, which are cleaned up by the bees and disease often carried into the hives. In several cases this appears to be the only reasonable cause for the breaking out of disease in certain districts. There is only one thing the Bee-keeper can do, that is keep his eye open for both the old containers and the appearance of disease.

One of the most important things next to cleanliness is to keep all colonies strong in bees, any weak ones in the Autumn or Spring should be united. Those getting weak through old or failing Queen should be re-queened if there is sufficient honey and pollen coming in.

I will now deal with the Cure of Disease after it has been discovered.

As Nosema and Acarine Diseases are not at present troubling the Australian Bee-keeper, we need not take up time describing methods of dealing with same.

European Foul Brood is not so serious as the American type although the spores of Bacillus pluton like that of Bacillus larvae are highly resistant to the action of all antiseptics, and the use of any for the purpose of cure is useless. It may, however, be given in food for the bees and has a good effect in preventing the putrifactive action of the secondary organisms, thus enabling the bees to more easily remove the dead brood.

The Method of Treatment is as follows.—Remove the combs of food stores and clean empty cells together with the bees, and place in a clean hive, sterilised by Izal 1 in 300 placed on the position occupied by the old hive. The old Queen should be destroyed, and the colony re-queened with a good Italian one from a strong stock, and stimulated by feeding for brood production.

Combs containing diseased brood should be destroyed by fire, but if there are a large number only slightly diseased, these may be sterilised by Formalin solution.

American Foul Brood.—Of all the diseases that we have in Australia this is the most difficult to eradicate. The spores of Bacillus larvae are very resistant to antiseptics and also to heat and may lie dormant for years.

When the larvae dies, the remains dry down to a brown tongue-like scale that adheres firmly to the lower wall of the cell. This scale contains millions of spores, which are like the seeds of a plant and only require suitable conditions for them to germinate and start the disease afresh. It has been proved beyond doubt that these spores are carried in honey and pollen. Experiments have been made by feeding healthy bees with honey from a diseased colony, and shortly afterwards the disease appeared in the brood of the healthy colony.

The method of treatment is as follows:—Prepare a new hive disinfected with Izal, and fitted with frames of foundation, no old combs must be used nor any food or brood. Towards evening remove diseased hive on one side, and place new hive on the old stand. Place a large sheet of newspaper in front of new hive right up to the entrance. Next shake all the bees from the old combs on to the paper in front of hive. The reason for the paper is that in shaking some honey may fall out of the old comb. As each comb is clear of bees it should be placed in a box inaccessible to bees. The paper must be destroyed by fire immediately the operation is complete.

As there are no combs in the new hive, the bees will consume any honey they carry with them for making wax for the new combs, therefore no food must be given and the bees left undisturbed for four days. It is also advisable to place a guard over the entrance to prevent the queen coming out and the bees absconding.

The infected hive to be immediately removed to a place inaccessible to bees. All frames and combs containing any diseased brood or dried scale must immediately be destroyed by fire.

Any combs containing honey alone may have the honey removed therefrom. Care must be taken that no bees have access to this honey or any apparatus that has contained same nor must the honey be put on the market.

These combs must then be sterilized by being completely immersed in a solution of 20 parts of Formalin to 50 parts of water for 48 hours. On removing the combs from the solution they should be washed with water by passing to and fro and backwards and forwards under a free flowing tap to remove all traces of formalin.

In most cases, it will not pay the bee-keeper to attempt this sterilising treatment, but to burn the combs of honey with the diseased ones.

Any combs that cannot be so treated must be destroyed by fire or melted down in boiling water for 30 minutes and any refuse therefrom destroyed by fire.

All parts of the hive and any apparatus that has come in contact with same, should be thoroughly scorched with a painter's blow lamp or immersed in boiling water for 30 minutes.

Tools and hands may be cleansed in a 50 per cent. Formalin solution.

The colony should be carefully watched for several weeks as occasionally a stray bee may carry the germs of the disease with it. In this case a second shaking will effect a cure. The bees may now be stimulated by feeding, preferably with syrup or honey medicated with Izal 1 oz. to 9-10 gallons.

Sacbrood.—There is no special treatment for this disease, as it usually disappears by itself, but in severe cases it is advisable to re-queen.

Chilled Brood.—Prevention by careful management is the only way of dealing with this.

Dysentry.—Prevention is again better than cure. Protect against extremes of cold in Winter. See that the colony has good food.

Paralysis.—In most cases, destroying the Queen of the infected colony and introducing a new one effects a cure in a few weeks. If there are any mouldy combs, remove same. Stimulate with Izal Syrup and disinfect with Izal 1-300.

Spring Dwindling and May Disease.—See that the colonies have plenty of good honey and pollen, and that the hives are weather proof, ventilated and suitable to the size of the colonies. If colonies become very weak, they should be united, and in many cases re-queened.

Bee Louse.—A few pieces of Naptha placed on the floor at the back of the hive, causes the louse to drop off.

Finally—Good clean hives. A strong disease-resistant strain of bees. A careful study of the natural healthy life of the bee is the best insurance any bee-keeper can have against disease.

STANDARD WHEAT VARIETIES.

AND WHEN TO PLANT.

I. Thomas,
Superintendent of Wheat Farms.

The disastrous results which were experienced by many farmers last year have caused them to realise the importance of fallowing. Important though this factor is, it must be remembered that success does not depend on this entirely. The necessity for liberal dressings of Superphosphate is also becoming more generally recognised; but the planting of suitable varieties at the correct time does not receive the attention that it warrants.

This may be due to ignorance on the part of many, and for the benefit and guidance of these, a planting table has been prepared together with details relative to characteristics of the recommended standard varieties.

Although the table refers only to these varieties, it may be applied to all varieties having similar maturity.

LATE MATURING VARIETIES.

Yandilla King.—A late variety with stiff and upstanding straw; a profuse stooler and good yielder. It is the best variety of the late class, and because of its excellent record on varied conditions of soil and climate it is considered the standard late variety. It is resistant to Flag Smut and Rust, escaping, but susceptible, to Bunt.

Baroota Wonder Early.—A standard hay variety of the older settled districts of the State. Two distinct types have been obtained from the old strain of this variety, one of which is much earlier than the other, and this has been retained. This matures about the same time as "Nabawa," and is an excellent yielder of prime quality hay. When sown for hay, however, it is advisable to treat it as a late variety and plant it early. It is a fair to moderate yielder of grain, liable to Rust and very susceptible to Bunt, but resistant to Flag Smut.

MIDSEASON MATURING VARIETIES.

Nabawa.—This variety has been produced by the W.A. Department of Agriculture with the object of replacing "Federation" in those districts where the liability to rust attacks renders the latter an undesirable variety. It has to its credit performances of great merit in both heavy and light land, and it has been found a prolific yielder in every district of the Wheat Belt; it is, therefore, the standard variety of the midseason class. It is susceptible to Bunt, but resistant to Flag Smut.

Dindiloa.—A variety of about the same maturity as "Nabawa." Of good straw, and probably more suitable for hay than "Nabawa." It is a consistent yielder but rather difficult to strip; an excellent milling variety; very resistant to Bunt.

EARLY MATURING VARIETIES.

Gluyas Early.—The standard variety of the "early" class. It has a great capacity for consistently yielding well under a low rainfall, but has a tendency to lodge especially in heavy weather. It is very susceptible to Bunt and Flag Smut, but is resistant to Rust.

S.H.J.—This is a variety produced at the Chapman Experiment Farm, and called after the late Samuel Henry Jupp, pioneer of that district (Nabawa). It is one of the most promising of the early varieties, and a consistent yielder. Its trials have indicated that it will thrive under the same conditions as "Gluyas Early" and may supplant that variety. It resists Bunt and Flag Smut as well as Rust.

EARLY VARIETIES WITH SPECIAL MILLING QUALITIES.

Comeback.—This is a standard milling variety of the Premier milling class. It is not particularly prolific, but suitable for both hay and grain, producing a very good quality hay. It is very susceptible to Bunt, but resistant to Flag Smut and Rust.

Carrabin.—A variety belonging to the same class as "Comeback." It yields well and consistently. It has stout straw and stands up well. Its defect is that it is rather difficult to thrash and on this account has not found as much favour with farmers as otherwise it would do. It is susceptible to Bunt, but resistant to Flag Smut and Rust.

VERY EARLY MATURING VARIETIES.

Noongar.—This is one of the latest productions of the Department of Agriculture and is probably the earliest variety in general cultivation in this State. In the trials at Kalgoorlie it has proved extremely drought resistant, and is now under trial in the extreme Eastern Belt, for which it is considered to be suitable for planting the latter part of May. It is susceptible to Bunt, but resistant to Flag Smut.

Geeralying.—This is a variety rather earlier than "Gluyas Early," but has proved particularly prolific in the extreme Northern part of this State, more so when sown towards the end of the season, *i.e.*, about the third week in May. It is rather tall in the stalk and therefore useful for hay and of great promise for the districts where early maturity is advisable. It is susceptible to Bunt, but resistant to Flag Smut and Rust.

STANDARD VARIETIES FOR THE DIFFERENT ZONES AND THEIR PLANTING DATES.

Varieties.	Early Zone.	Midseason Zone.	Late Zone.
Late Varieties.			
Yandilla King Baroota Wonder Early (For Hay)	April 1st to April 21st	April 1st to May 7th	April 1st to May 21st.
Midseason Varieties.			
Nabawa ... Dindiloa ...	April 21st to May 14th	April 21st to May 21st	May 7th to May 30th.
Early Varieties.			
Gluyas Early ... S.H.J. ... ... Carrabin ... Comeback ...	May 7th to May 30th	May 14th to May 30th	May 14th to June 21st.
Very Early Varieties.			
Noongaar ... Geeralying ...	May 21st to May 30th	May 14th to May 30th	May 14th to June 21st.

POTATO GROWING.

THE VALUE OF A CHANGE OF SEED.

W. E. Collins,
Potato Inspector.

When a grower has found that it pays him to obtain seed of a certain variety from a certain source, he should endeavour by experiment and calculation to learn whether it will pay him to change his seed every year, every two years, or every three years.

It is very evident, and is known from experience by many growers, that profitable yields cannot be obtained from the continued use of home grown seed.

The decline of vigour is often due to want of care in the selection of tubers for seed, and to the method of handling same between digging and planting time, or, it may be attributed to the persistent planting of unsprouted and unrested seed.

In certain South-West districts, it is common practice to do this, the cut sets lying dormant after planting in the cold wet soil for the lengthy period of 8 to 10 weeks before germinating. This must mitigate largely against high yields and may give a semblance to any one of the virus troubles so prevalent in this area, whilst not being actual.

This assumption being based on the fact, that many times identical seed has been planted at a later date with a consequent vigorous and healthy growth, and with far heavier yields.

When one considers the possible chemical changes occurring within the "set," the loss of plant food by soil organisms, besides the leaching away of valuable essentials from the fertilisers by the heavy rains, it will appeal to all thoughtful growers the wisdom of planting more forward or "sprouted" seed.

Nevertheless, it has been found that, with every care taken in selection and storing, a variety has ceased to yield a satisfactory crop. This decline suggests the presence of a disease or degeneracy, and in such cases a change of seed is necessary. Too much stress can hardly be laid on the importance of securing new seed from a district known by previous experience to give a good change.

With all crops the proper selection of seed is essential to success, but in the growing of potatoes, it is of primary importance. The origin and treatment of the seed has often a greater influence on productiveness than methods of cultivation, manuring, etc., and neglect to pay proper attention to these points may nullify the care, labour and money expended on cultivation and fertilisers.

Results of experiments with seed, which have clearly shown the advantage of obtaining a change, could be quoted almost indefinitely, and the growing trade in seed potatoes from our Southern Areas, especially those grown under Government supervision, is clear evidence of the importance attached by growers to the effect of a change. Reports from numerous growers, in a number of cases, state that Certified Seed gave double and treble the yield of their home grown seed.

Southern grown seed is, at present, generally accepted as being more productive than that grown in the South-West areas, the difference being ascribed to the care taken, the longer rest period between cropping and to the cooler and more favourable climatic conditions under which they are grown. But Benger Swamp seed should, and will be comparable with the best of the Southern product, since tuber forming and the maturing of crops takes place during the cooler months of Autumn.

Swamp growers have invested largely in Certified Seed, which gave gratifying results in the general crop, and quite a lot of the progeny has been planted this current season. It only remains for those desirous of selling part of their product for seed, to exercise the same care that is taken by our Southern growers.

It is well known that the locality, where seed potatoes are produced, has an important bearing on productiveness and Benger Swamp has not entirely lost the reputation of producing tubers highly desirable for seed purposes.

The method which has been largely adopted for some years by the Southern growers is to select seed size tubers from crops grown in the late winter or early spring, these are placed on shallow racks and stored, tier form, in either well ventilated and well lighted sheds, or under bough covered shelters. From time to time the order of the racks is reversed, so as to ensure an equal amount of light to all the potatoes. This treatment leads to the greening of the seed, and the development of short, sturdy green sprouts, which do not easily break off during planting, instead of the long and thin bleached shoots of those stored in bags in dark sheds, and which are sure to be rubbed off.

Seed, when thus sprouted, gives the grower the opportunity of discarding "rogues," those of weakly growth, and the elimination of any tuber showing signs of disease. It is this care, combined with the close field inspections, given by the officers of the Potato Branch, and the grading carried out at harvesting, that go to the perfecting of the Certified Seed Scheme—making this seed more desirable than that generally retained from ordinary commercial crops.

Records of experiments conducted with sprouted and unsprouted seed are unanimous in one respect—the sprouted seed always matures earlier, and it has been definitely shown that when crops derived from the two types of seed are compared, that produced from sprouted seed is always the greater in yield.

HORTICULTURAL NOTES.

Geo. W. Wickens,
Superintendent of Horticulture.

SEASONAL WORK FOR APRIL, MAY AND JUNE.

April.

April is the best month for making the general application of fertilisers in deciduous orchards: 6 cwt. of superphosphate, 2 to 3 cwt. of muriate or sulphate of potash per acre, with 1½ bushels of peas sown in April and ploughed under in spring will keep all trees in good heart. Apple trees in particular will need heavily fertilising to enable them to stand the strain of the very heavy crop which has been borne this year.

Where citrus orchards are being treated, use half the super. and half the potash mentioned above, and apply the remainder in spring.

If for any reason, peas cannot be grown satisfactorily, use 2 to 3 cwt. of sulphate of ammonia or nitrate of soda; apply same in spring, whether the orchard to be fertilised is citrus or deciduous.

In orchards where Citrus Brown Rot was experienced last season, citrus trees should be sprayed to a height of four to five feet from the ground, together with the land under, and extending for a foot or more outside the spread of the branches. Use Bordeaux at a strength of 4 lbs. bluestone, 4 lbs. freshly-burned lime to 50 gallons of water; or Burgundy at a strength of 4 lbs. bluestone, 6 lbs. washing soda, 50 gallons of water. The trees should not be sprayed all over or the beneficial fungi which attack lecanium scales will be destroyed, and these pests will increase with great rapidity.

In districts where Fruit Fly exists every care should be taken to collect all second crop deciduous fruits which, owing to having no commercial value, are often allowed to remain on the trees, become infested, and carry on the pest to the orange crop. All fallen fruits should be collected, and those of no value destroyed by boiling.

May.

Pruning will now claim the attention of growers of stone fruits, particularly in the early districts near Perth, where most varieties of apricots, plums and peaches will have shed their foliage. Where varieties of peaches liable to shed their buds ("Briggs," "Hales," "Downing," "Alexander," etc.) are grown, it is advisable to delay pruning until the buds have burst in early spring.

Spray deciduous orchards for the control of San José Scale as soon as the leaves have fallen, using commercial lime sulphur at a strength of one gallon in seven gallons of water, or a reliable brand of spraying oil may be substituted for lime sulphur, using one gallon of oil in 19 gallons of water. To keep San José Scale in check it is necessary to spray twice while the trees are dormant: the first to be applied as early as possible after the leaves have fallen, and the second towards the end of winter in late August. As August is often a very wet month, care should be exercised in making the May spraying a very thorough one.

Where orange and lemon trees in affected orchards were not treated for Brown Rot last month they should be sprayed during the early part of this month, using Bordeaux or Burgundy as advised in April notes. In tests made both by this Department and individual growers it has been shown that one spraying in April or early May is sometimes sufficient to control the disease for the remainder of the season, but should the season prove favourable for the fungus, the trees should receive a further spraying when signs of infection appear. Later sprayings have the effect of spotting the fruit, but it is better to remove spray spots from sound fruits at time of picking than to have the crop destroyed by disease.

With the advent of wet weather, baiting operations for Fruit Fly are largely ineffective, but trapping in orange and lemon groves should be continued throughout the winter months.

June.

Pruning of all deciduous trees should be pushed on with during this month.

Planting may be undertaken wherever the soil is not too wet and sticky.

Young plants, when received from the nursery, should be heeled in carefully so as to prevent the roots from drying out. To do this effectively the bundles of ten, in which the nurserymen usually tie up the trees, should be opened and each tree placed separately in the soil. If this is done as soon as the trees arrive, no harm will result if the planting has to be postponed for some weeks in the months of June or July.

The notes on planting for this month refer to deciduous trees only. Citrus trees give best results if planted at the latter end of August or early in September.

Any San José Scale infested orchards which have not received the first spraying mentioned in notes for May, should be treated as early as possible this month.

Citrus growers should examine cracked oranges for signs of Fruit Fly, and destroy any found to be infested.

The orange export season commences this month, and this opportunity is taken again to stress the importance of handling the fruit most carefully when gathering, packing and loading. Bruised fruit and fruit with skin abrasions caused by finger nails will develop moulds and arrive in an unsaleable condition, a loss directly to the sender to the extent of the affected fruit, and indirectly and probably a much greater loss in bearing down the price of sound fruit offering on the same market.

THE SUBTERRANEAN CLOVER WEEVIL.

(*Listroderes praemorsa.*)

L. J. NEWMAN,
Entomologist.

Order: *Coleoptera.* Family: *Curculionidae.*

During the past winter and spring complaints were received by this office to the effect that something was seriously destroying the Subterranean Clover (*Trifolium subterraneum*).

The complaints were at once investigated, revealing the causative factor to be the above weevil. In further prosecuting the investigation, it was discovered that similar damage was being done to the crops in several of the South-West areas.

Listroderes obliqua (Gyll).
Dorsal or Back view.

(× 6 *Original.*)

Indirect evidence was also found that the weevil had been at work the previous year, but not seriously. The past season was the first record of it appearing in plague form over considerable areas.

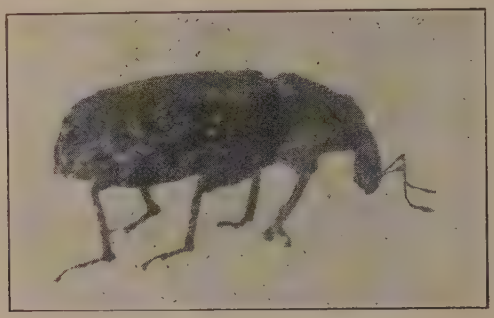
The same insect has been known as a minor pest in the metropolitan districts for many years. Its appearance in the role of a clover pest is a more recent and serious development.

In view of the fact that Subterranean Clover is one of the most important of our field fodder crops, every effort will need to be made to check this insect.

The common Cape Weed (*Cryptostemma calendulaceum*) is also a favoured host plant. Tomatoes, potatoes and other garden crops are sometimes attacked. Subterranean Clover appears, however, to be the favoured one when available.

This destructive beetle belongs to a small group of weevils, which damage plants both in the larval and adult stages of their existence. It is one of the *Curculionidae* and belongs to the Genus, *Listroderes,* and is specifically named ***Listroderes praemorsa.***

Another weevil belonging to the Genus *Listroderes,* and known as *Listroderes obliqua* (*nocira Lea*) is also found in the South-West. So far this closely related beetle has not become a clover pest, confining its attacks to carrots, potatoes and other garden crops.



Listroderes obliqua (Gyll).
Side view.

(× 6 *Original.*)

DESCRIPTION OF *LISTRODERES PRAEMORSA.*

The Larva.—When first hatched is very small and of a light creamy colour, with black head. As it grows and moults, the body becomes a translucent green colour, due to the green food contents of the digestive organs. The larva is of a more slender form than the usual weevil grub. The body is slightly under ½in. long, somewhat tapered at each end and wrinkled. The head and thoracic plate are yellowish-brown, with four ocelli or simple eyes. A series of dotted lines on the head form a fairly regular pattern about the Y-shaped suture on the vertex on the head. The thoracic plate is inconspicuously divided in the centre, paler than head and darker towards the extremities.

Like all weevils, these grubs are legless, but the ventral side of each segment, is provided with a transverse row of four tubercles, which enable the larva to hang on to its food and also move about readily from plant to plant.

Further, just below the breathing spiracles, on either side are two longitudinal rows of tubercles or sucker feet, which give attachment to the

plant. These tubercles are not armed with short spines, as in the case of its near relative *Listroderes obliqua.*

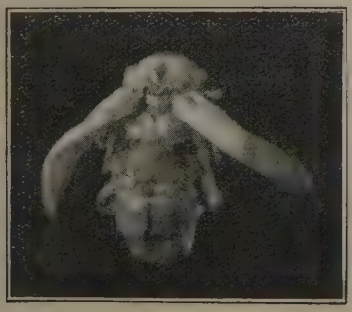
The grubs live gregariously, that is, they move about in armies taking the Subterranean Clover on a face. The feeding is mainly done at night, but advantage is taken of dull cloudy days to feed. The larva lives for a period of 12 to 14 weeks.

Larva or Grub,
Listroderes praemorsa.

(× 4 Original.)

When fully grown it burrows into the soil to a depth of 1½ to 2 inches, forms an earthen cell, and therein pupates. This takes place in late August to end of September.

Pupa.—This is the resting stage when the grub is transformed into the adult beetle. It is of a pale greenish-yellow, has a general resemblance



Pupa,
Listroderes praemorsa.

(× 5 Original.)

to the adult, and is slightly shorter than the larva. Legs, antennæ and wing pads can all be observed. The short, broad rostrum or beak is seen to be folded backwards, along the ventral or under surface of the body.

Between the eyes are three pairs of stiff brown bristles, arranged in an arc. Just below these, on the rostrum, are six smaller bristles. Further down, nearly to the jaws of the rostrum, are two more larger ones. Similar spines exist on the thorax and abdomen.

Each of the eight visible abdominal segments has a transverse dorsal row of spines. When disturbed the pupa will rapidly rotate the abdomen, turning the whole body round and round.

As the time approaches for the adult to emerge, the eyes of the pupa become prominent, the beak, legs and antennae become reddish brown. The period occupied by this stage, under cage incubation, was 17 to 21 days.

The Imago or Adult.—On emerging from the pupa the adult is quite soft and of a pale rusty-brownish colour, and one-third of an inch long. The beetle does not issue at once from its earthen cell, but remains quiet for two or three days. During this time the chitinous wing covers of the

Imago or Adult,
Listroderes praemorsa.
Dorsal or Back view.

(× 6 *Original.*)

body harden up and generally assume a light fawn or brownish colour, very similar to the colour of the soil. When ready the weevil cuts a hole in the cell, pushes its way to the surface of the ground, and is then ready for its adult duties.

It is a typical weevil, with short stout beak, bearing the usual elbowed antennae clubbed at the tip. The chewing jaws are situated at the tip of the snout or beak. The general colour after exposure to the surface light is brown, with the sides of the wing covers light fawn. The elytra are deeply striated, giving a corrugated appearance when looked at with a lens. There is a line of white scales running longitudinally on the thorax.

Two oblique patches, consisting of light-grey scales forming somewhat of an inconspicuous V-shaped mark are to be seen at the posterior ends of the elytra.

Just below these marks are a pair of processes giving a pointed or spined appearance.

The legs and under side of the body are dark red. When handled it feigns death.

Efforts have been made to induce flight, but although flight wings are present, this act has not yet been observed. In the field the beetles make no effort to fly from place to place, but will crawl rapidly over the ground. It may be that the flight wings are only used during the breeding season. The adult beetles live for several months. They make their main appearance in October, November, some early ones appearing in September. The clover and grasses are then beginning to dry up. The weevils have no incentive to lay their eggs when the natural food is drying up. They appear

Imago or Adult Listroderes praemorsa.
Side view.

(× 6 Original.)

to hide away in cracks and crevices in the soil, under logs, stones, loose bark, cracks in fence posts, or any other place that offers suitable shelter. Many beetles die during this carry-over period. Upon the advent of the autumn rains the survivors probably come forth and lay their eggs amongst the young clover seedlings. The life history is peculiar in that it is active during autumn, winter and spring, the adults aestivating or hiding away during the dry summer months. There is only one generation each year, with considerable overlapping of the life stages.

Several points concerning the life history of this weevil have yet to be cleaned up.

Nature of Damage done.—The young grubs upon hatching from the eggs at once begin their attack upon the foliage of their food plant, whether it be Cape Weed, Potato or Subterranean Clover. They feed on the under

side of the leaf. As they grow they become more voracious and consume the Subterranean Clover foliage, both stem and leaf, leaving the ground perfectly free and bare. It is the presence of these barren patches that attract the attention of the farmer, indicating that something is radically wrong.

An examination in the day time might fail to reveal the culprit, as the grubs are hidden away, being in the main nocturnal feeders.

Peculiarly the other clovers and grasses do not appear to be seriously attacked by this weevil.

A characteristic feature noted was the outbreaking of the weevil in small circular patches.

As the young grubs grow they work outwards from the centre forming ever-widening circles. Numbers of these circular patches would form, which eventually coalesced, forming larger areas. Some patches would extend over an acre of ground. The Subterranean Clover so eaten down never made a satisfactory recovery. The loss occasioned by this weevil on a farm would be very serious if allowed to go unchecked. Whether being grown for hay, seed, or as a grazing crop, the economic loss is great.

Combined with the ravages of the Lucerne Flea (*Smynthuris virides*) the Subterranean Clover is seriously threatened as a fodder crop in the South-West. When insects appear in serious numbers over large areas of country, their control by artificial measures is difficult and costly.

Prevention.—In carrying out the investigation of this pest, it was definitely proved that clover lands became what is termed "Clover sick." This is a term which might mean anything. The facts found to bring about these conditions were the accumulation of insect pests, fungoid disease and weeds, the clover becoming more or less overcome.

To prevent this position from arising, it is necessary to fallow the clover paddocks every third or fourth year. This method will also act as a check upon other serious Subterranean clover pests, namely the Lucerne Flea (*Symnthuris viridis*) and the Red Legged Earth Mite (*Penthaleus destructor*).

To obtain the maximum effect from fallowing, it is essential that it be undertaken as soon as it is possible to get on to the land in the spring, certainly not later than mid-September. If left later, many of the grubs will have reached the pupae stage, and consequently, although turned over in the ploughing, many will issue as beetles. By turning in early the larvae are starved, and consequently never reach the beetle stage. The fallow must be kept free of weeds or clovers and worked now and then. Land so treated can be resown to oats and clover the following autumn.

The fallowing will have to be done systematically, the farm being so divided that each year some portion will be turned over. This process I am convinced will more than repay the cost entailed by the improved feeding value of the clover crops which follow.

The ideal of permanent pastures is readily taken up by the farmer, as it means a reduction of labour. The plough can be largely dispensed with. Unfortunately the introduction and appearance of the various pests to which Subterranean Clover is very susceptible has created the necessity

for the application of the principle of fallowing to check and steady up their increase. If this is not done, it would appear that the combined pests will so reduce the value of Subterranean Clover as to render it a very secondary fodder or grazing crop.

The spread of the weevil into new areas can be largely prevented by using only cleaned seed. There is always a danger that the weevil eggs have been laid upon the "burr" before being harvested.

Do not cart infested clover hay about, as this is a fruitful means of spreading the weevil. Seeing that this beetle has no long distance powers of flight, it is obvious that its spread must depend upon artificial means.

Destroy by fire all heaps of rubbish, long grass or weeds along headlands and fence alignments, as such places afford shelter to the over-summering weevils. Heaps of litter left about and regularly examined can be used as decoy traps. The beetles collect under these heaps, and if examined each day numbers of the adults can be destroyed.

To prevent the spread of any pest prompt action is essential. To sit back and chance what will happen next year is often to court disaster.

Treatment.—A number of experiments against this pest have been carried out, many of them giving negative results.

In this article it is only proposed to give those treatments which proved economically successful.

A bait composed of the following ingredients gave excellent results:—Bran, 30 lbs.; molasses, 4 lbs.; arsenate of soda or Paris green, 1 lb; water to bring to a consistency of a crumbling mash. This is sufficient for one acre of ground.

The bait is distributed in the evening along the line of advance of the weevil larvae. When the grubs come forth at night they discover the tempting bait and readily partake of it, resulting in their death.

It is not necessary to apply the bait to the area already denuded by the grubs, as they are only to be found on the edge of the still standing clover.

This operation repeated two or three times will completely wipe out a swarm.

Arsenate of lead used either as a spray or dust was also found to be an effective poison.

Formula.—Paste arsenate of lead 1 lb. or powdered arsenate of lead ½ lb., water 16 gallons. Spray along the edge of clover patch just in advance of the army of grubs. If using the dry powdered form as a dust, apply by means of a dusting machine in the same way, to the moist foliage.

In using any of the posion baits or sprays, it is essential to see that all poultry or cattle are kept from access to same until a period of at least three weeks has elapsed after the last application.

In conjunction with the application of the poisons the ploughing or cutting of a sharp trench in front of the weevils effectively checks their advance. They do not appear to be able to cross the ditch. Poison bait placed along the furrow will poison any that may fall into it.

It is a good plan to isolate each weevil patch by encircling with a trench, and then apply the poisons.

If the above recommendations are promptly applied, this pest can be controlled. If, however, it is allowed to extend its ravages it has very destructive possibilities, and might in time completely ruin any Subterranean Clover pasture into which it is introduced and established.

The life cycle is still being studied, and further experimental work is planned for the coming winter and spring.

Efforts are also being made to discover some natural enemies, and to this end Dr. Meyers, of the Imperial Bureau of Entomology, London, is, whilst in Brazil, looking out for any possible parasites, as it is suspected that this weevil originated in South America, being introduced into Australia.

Summary.

This pest appears in autumn, winter and spring.

The adult weevils aestivate or oversummer, hiding away in any suitable sheltered positions.

The eggs are laid upon the young plants in autumn.

The larvae feed gregariously, cleaning the crop up on a face.

Pupation takes place in latter August to the end of September.

First beetles emerge mid-September, main swarm October, November.

There is only one generation each year, with considerable overlapping.

Subterranean Clover appears to the favoured food plant.

Cape Weed and other plants are also attacked.

Indications of presence of weevil—bare patches in the field.

Weevil can readily be destroyed by spraying or dusting with arsenate of lead.

Poison bait can be used with good killing effect.

Ploughing a sharp trench ahead of the advancing weevil larvae will effectively check their advance.

Poison bait should be placed in the trench.

Fallow. This method of farming should be adopted for many reasons.

The turning in must be done by mid-September.

Keep fallow free from any plant growth.

Turn over land every third or fourth year.

The following autumn sow down to Oats and Subterranean Clover.

THE "ROYAL" AND DISTRICT AGRICULTURAL SOCIETIES' CROP COMPETITIONS.

I. THOMAS,
Superintendent of Wheat Farms.

The Royal Agricultural Society has promoted, during the past five years, competitions for wheat crops of not less than 50 acres of any one variety amongst the district Agricultural Societies in each of the eight zones into which the Wheat Belt has been divided for the purpose of these competitions. In each of the eight zones a championship prize is awarded for the best crop, also a second prize is awarded for the runner up, those eligible for these prizes being the first and second prize winners of the competitions held by the district Agricultural Societies, provided they are held in accordance with the conditions laid down by the Royal Agricultural Society. These conditions require that the crop shall be grown on fallowed land, shall not be less than 50 acres in area of one variety and shall be judged according to the following scale of points:—

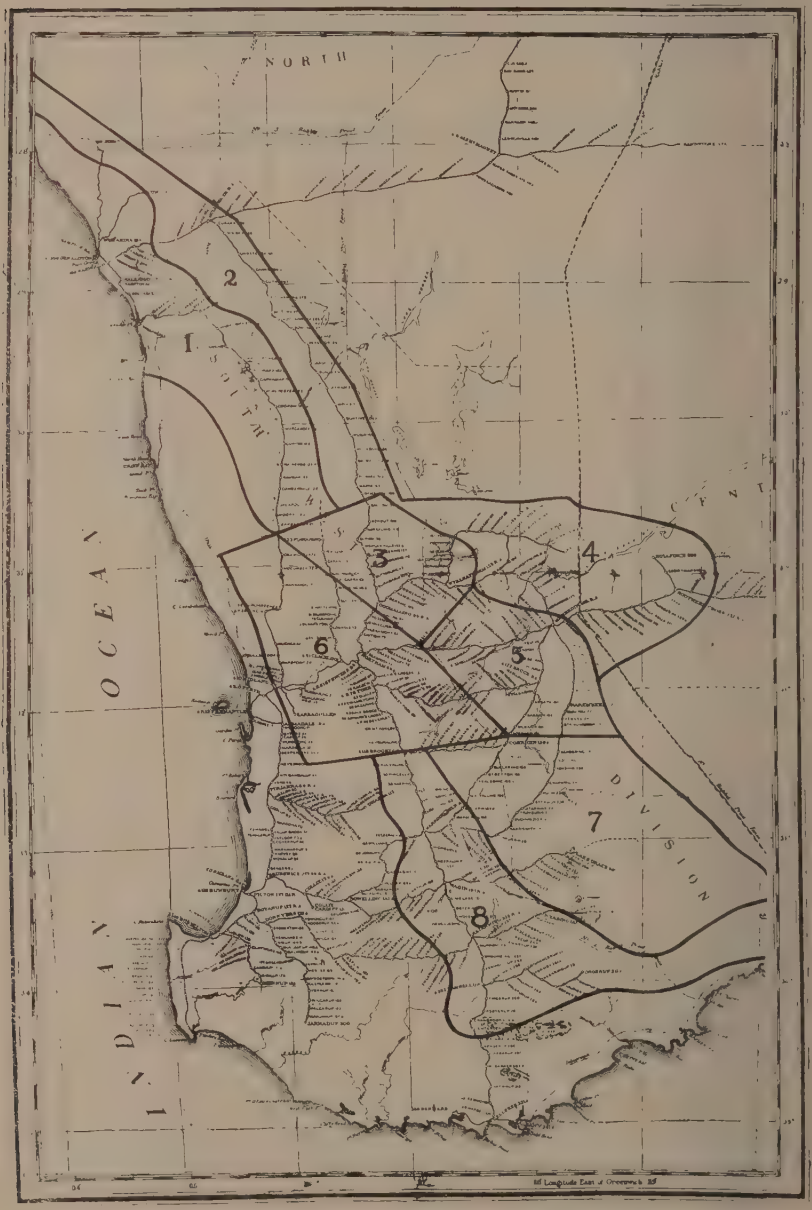
Yield	40
Freedom from weeds	20
Freedom from disease	15
Freedom from admixture	15
Eveness of growth	10
Total	100

The judges of the Royal Crop Competitions since their inception have been departmental officers attached to the Wheat Branch, and the same officers have also judged the majority of the district competitions. As it is obviously desirable that all the crops in any one zone should be inspected and the awards for the championship prizes made by the same judge, and as it is the definite and strong wish of many district societies that departmental officers should continue to judge their competitions, the zones are arranged so that the societies which are adjacent to each other and which have similar interests and climatic conditions, are grouped together. This requires the Wheat Belt to be divided into eight zones.

The eight zones into which the Wheat Belt is divided for the purpose of the competitions are as shown on the accompanying map.

In some districts the Agricultural Societies make no provision for crop competitions, and in order to prevent farmers who live in such districts being debarred from competing for the championship prize in their zones, the Royal Agricultural Society permits such farmers to enter for the competition directly through that Society.

The reports and awards made by the respective judges in the different zones are hereunder. The points awarded for yield are not based upon the estimated yield, but upon that calculated from portions of the crop obtained from small areas taken systematically throughout the crop. These portions of the crop are threshed and the grain weighed.



ZONE I.

Judge F. L. SHIER, B.Sc. (Agric.), Agricultural Adviser.

The competitors in this Zone numbered five, all of whom entered direct with the Royal Agricultural Society, three of the original nominators withdrawing before the final inspection.

The points were awarded as hereunder:—

Table 1.

ROYAL AGRICULTURAL SOCIETY.

Zone 1.

Judge: F. L. Shier, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Admixture. 15 points.	Freedom from Disease. 15 points.	Evenness of Growth. 10 points.	Total. 100 points
Forrester, J. K.	Carnamah ...	Nabawa ...	35	16	13	14	9	87
Hebiton, J. K.	Three Springs	Merredin ...	30	16	13	13	9	81
Hunt, E. ...	Three Springs	Carrabin ...	28	15	14	14	8	79
Cuming Bros.	Inering ...	Nabawa ...	28	15	13	12	8	76
Bothe, B. D.	Coorow ...	Nabawa ...	24	14	14	13	7	72

The winning crop of Mr. J. K. Forrester of Dunester, Carnamah, was a very creditable one, of the popular variety "Nabawa," and was calculated to yield 35 bushels per acre. It was planted during the first week in May at the rate of 50 lbs. of graded seed, with an application of 110 lbs. of

J. K. Forrester's 50 acres "Nabawa."
Winner—Championship Prize, No. 1 Zone. Yield—35 bushels per acre.

Superphosphate per acre. The crop was of a good height, well stooled and very even. No disease was found, but an odd head of Barley and small quantities of wild oats and mustard were present. Sheep were pastured on the fallowed land previous to its being cropped.

The rainfalls as officially recorded at Carnamah, Three Springs and Coorow are shown in the following table for comparison.

	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Carnamah	26	...	23	46	166	201	463	204	99	41	1,174	8	53	1,310
Three Springs	42	...	24	39	168	174	400	160	87	40	1,029	2	50	1,186
Coorow ...	25	...	23	57	195	144	414	186	106	62	1,107	4	58	1,274

The rainfall was rather light during the latter end of the season. At Mr. Forrester's from the first week of September to mid October only 37 points were recorded in six separate falls.

Mr. J. K. Hebiton's crop which gained second prize was of the variety "Merredin," and was calculated to yield 30 bushels per acre. It was planted early in June with 50 lbs. of graded seed and 112 lbs. of superphosphate to the acre. A few plants of wild oats, mustard and double gee were present, and also a trace of Loose Smut and Take-all.

Another creditable entry was that of Mr. E. Hunt. This was of the Premier Strong White Class, variety "Carrabin" and was calculated to yield 28 bushels to the acre. It was portion of a paddock of 60 acres and this yield tends to disprove the popular belief of the inability of the strong wheats to yield well.

The other entries were of a high standard and the average yield of 29 bushels per acre for this zone which is situated in the Midland Districts is very pleasing.

The cultural and cropping details of the various entries are shown hereunder for comparison.

TABLE 2.

ROYAL CROP COMPETITION.

ZONE 1.

Competitor ...	Forrester, J. K.	Hebiton, J. K.	Hunt, E.	Cumming Bros.	Bothe, B. D.
Years cropped	5 to 6. Cleared 1921	14	4th. All after fallow	7 to 10	Old land
Timber and land	Heavy red loam. York Gum and a little Salmon	Salmon Gum and Morrell	York Gum and a little Salmon Salmon	Salmon, Gimlet and Black Wattle	Salmon and York Gum
Ploughed and type of plough	Disc. June	July, half disc and half Mouldboard	First week July	Early June, Mouldboard	Disc ploughed, July
Depth ...	4in.	3½in. to 4in.	4in.	5in.	3in. to 4in.
Other cultivations	Springtyne cultivated Sept. and again Oct.	Harrowed twice Spring and early Summer. Ploughed after rain before seeding to kill weeds	Springtyne cultivated first week August, again Sept. and prior to seeding	Springtyne cultivated Sept.	Disced August and again Sept. Harrowed Oct. and disced before seeding
Variety ...	Nabawa	Merredin	Carrabin	Nabawa	Nabawa
Planted ...	Combined first week May	Disc drilled early June	Combined 20th May	Combined mid-May	Combined third week May

TABLE 2, ZONE 1—*continued.*

Competitor ...	Forrester, J. K.	Hebiton, J. K.	Hunt, E.	Cumming Bros.	Bothe, B. D.
Rate of seed...	50lbs.	50lbs.	48lbs.	60lbs.	60lbs.
Graded ...	Graded	Recleaned	Graded	Graded	Graded
Treated ...	Dry	Dry	Dry	Dry	Dry
Rate of super.	110lbs.	112lbs.	96lbs.	112lbs.	112lbs.
Disease ...	...	Trace loose Smut and a little Take-all	...	Trace Ball Smut	Trace Take-all
General ...	Sheep on fallow	Sheep on fallow. Three course system	Sheep on fallow	Sheep on fallow	Sheep on fallow

ZONE II.

Judge: F. L. SHIER, B.Sc. (Agric.), Agricultural Adviser.

For this zone five entries were submitted through the Dalwallinu Agricultural Society and two were received direct by the Royal Agricultural Society.

DALWALLINU AGRICULTURAL SOCIETY.

Two of the entrants from the Dalwallinu District withdrew prior to the inspection.

The awards made are as follows:—

TABLE 3.

DALWALLINU DISTRICT AGRICULTURAL SOCIETY.

ZONE 2.

Judge: F. L. Shier, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Admixture. 15 points.	Freedom from Disease. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
R. J. Honner & Sons	Dalwallinu ...	Gluyas Early	25	16	13	14	9	77
F. C. Locke ...	Dalwallinu ...	Ford ...	20	15	13	14	7	69
Bradford Bros	Damboring ...	Nabawa ...	18	15	14	14	8	69
W. H. Sawyer	East. Dalwallinu	Nabawa ...	15	17	13	14	8	67
W. M. Harris	Dalwallinu ...	Merredin ...	16	15	13	12	8	64

The rainfall recorded at Dalwallinu is as follows:—

——	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	ov.	Dec.	Total for year.
Dalwallinu	49	...	13	42	136	128	307	168	93	48	880	...	74	1,056

The winning entry of R. J. Honner and Sons was of the variety "Gluyas Early," and was calculated to yield 25 bushels per acre. This is

a very creditable yield and supports previous conclusions regarding the drought resisting qualities of this variety.

The crop was of a nice even height, and fairly well stooled, the heads being well filled with plump grain.

Odd heads of barley and a little mustard were present. No disease was noticed.

Mr. F. C. Locke and Bradford Bros, tied for second place.

Mr. Locke's entry was of the variety "Ford" and calculated to yield 20 bushels per acre. Points were lost, however, owing to the presence of Barley, mustard and heads of strange wheat varieties. The crop was uneven owing to the varying nature of the land. It had been fed off by sheep until the middle of June.

Messrs. Bradford Bros.' entry was "Nabawa," and was calculated to yield 18 bushels per acre. It was fairly even, but contained a fair quantity of mustard. Like all the crops in this district, it suffered considerably owing to the low rainfall.

Four of the competitors in this competition used the dry method for the prevention of Ball Smut and no disease was noticed.

The methods of cultivation of the competitors are summarised as hereunder:—

TABLE 4.

DALWALLINU DISTRICT CROP COMPETITION.

ZONE 2.

Competitor ...	Honner, R. J.	Locke, F. C.	Bradford Bros.	Sawyer, W. H.	Harris, W. M.
Years cropped	Fifth crop	6	8	Fairly new—1st fallow	5–6 crop. Cleared 14 years
Timber ...	Gimlet, Salmon and Tea-tree	Salmon, Gimlet and Morrell	Gimlet	Salmon and Gimlet	Salmon, Morrell, Gimlet
Ploughed and type of plough	Mouldboard, June	Mouldboard, end July	Disc, early June	Disced Sundercut early Aug.	June
Depth ...	4in.	3in. to 4in.	4in.	3in.	4in.
Other cultivations	Springtyne cultivated twice Spring and before seeding	Springtyne cultivated early Sept., again October, and prior to seeding	Springtyne cultivated in September	Disc cultivated in May	Cultivated twice in September
Variety ...	Gluyas Early	Ford	Nabawa	Nabawa	Merredin
Planted ...	12th May	Disc drilled 10th May	Combined early May	15th May	Combined third week May
Rate of seed...	60lbs.	58lbs.	60lbs.	50lbs.	50lbs.
Graded ...	Graded	Graded	Graded	Recleaned	Graded
Treated ...	Dry	Dry	Dry	Dry	...
Rate of super.	90lbs.	85lbs.	85lbs.	60lbs.	93lbs.
Disease ...	...	...	...	...	Trace Ball Smut and loose Smut

ROYAL AGRICULTURAL SOCIETY.

In Zone 2, two entries were received direct by the Royal Agricultural Society. The points awarded are as follow:—

TABLE 5.

ROYAL AGRICULTURAL SOCIETY.

ZONE 2.

Judge: F. L. Shier, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Admixture. 15 points.	Freedom from Disease. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Porter, F. A.	North Ajana	Nabawa ...	21	16	12	14	9	72
Meadowcroft Bros.	Ardingly ...	Toby's Tusk	20	16	12	14	9	71

The rainfall recorded at Ajana and Tenindewa is as follows:—

——	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Ajana ...	53	...	39	54	280	201	277	128	83	53	1,022	...	32	1,200
Tenindewa	16	30	95	75	213	136	259	103	46	37	794	10	70	1,090

Mr. Porter's crop, calculated to yield 21 bushels per acre, was of the variety "Nabawa." This farm is the most Northern wheat farm in West Australia, being located 10 miles north of the rabbit proof fence. Mr. Porter is to be congratulated on his enterprise in pioneering this new district.

The crop was of a nice even height, but points were lost owing to the presence of "strangers," barley and radish. No disease was noticed.

The cultural details of the two crops are as follows:—

TABLE 6.

ROYAL CROP COMPETITION.

ZONE 2.

Competitor	Porter, —	Meadowcroft Bros.
Years cropped	Fairly new land, 1st fallow	...
Timber	York Gum	York Gum and Jam
Ploughed and type of plough	Sundercut. August	Mouldboard. June and July
Depth	3in.	4in.
Other cultivations	Disc cultivated in January	Springtyne cultivated September and again prior to seeding
Planted	Last week April	Disc drilled early May
Rate of seed	50lbs.	60lbs.
Graded	Recleaned	Recleaned
Treated	Dry	...
Rate of super.	112lbs.	80lbs.
Disease	...	...

Zone 3.

Judge: A. S. WILD, B.Sc. (Agric.), Agricultural Adviser.

Entries for Zone 3 were received from the Dowerin, Goomalling, Wongan Hills and Wyalkatchem Agricultural Societies.

DOWERIN AGRICULTURAL SOCIETY.

In the competition of the above Society, six competitors submitted crops for inspection. The points awarded are as hereunder:—

TABLE 7.

DOWERIN AGRICULTURAL SOCIETY.

ZONE 3.

Judge: A. S. Wild, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Cosh, E. C. ...	Minnivale ...	Merredin ...	24	19	12	14	9	78
Hughes, J. J. R.	Minnivale ...	Nabawa ...	26	17	12	14	8	77
Jones, J. S. ...	Ejanding ...	Nabawa ...	20	19	13	13	8	73
O'Loughlan, M. J.	Minnivale ...	Merredin ...	21	17	13	13	9	73
Thomas, T. ...	Dowerin ...	Nabawa ...	18	18	14	14	8	72
Jones, A. ...	Ejanding ...	Nabawa ...	17	18	13	14	8	70

Mr. E. C. Cosh's crop, which secured first place, was of the variety "Merredin." It was planted early in May at the rate of 45 lbs. of seed per acre with an application of 100 lbs. of superphosphate per acre. It was practically free of weed growth, very even, with little or no admixture. Traces of Flying Smut, Ball Smut and Flag Smut were noticed.

Mr. J. Hughes' crop of "Nabawa" although calculated to yield 26 bushels per acre, lost points for weeds and evenness of growth, and consequently was forced to take second place.

The rainfalls as officially recorded at Dowerin, Minnivale and Ejanding during the year were:—

	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Dowerin	93	...	62	40	126	164	352	146	88	23	899	14	12	1,120
Minnivale	42	...	118	10	125	125	306	259	95	22	932	2	34	1,138
Ejanding	...	...	64	12	104	82	333	204	87	25	835	3	58	972

The details of the cropping are as hereunder:—

TABLE 8

DOWERIN DISTRICT CROP COMPETITION.

ZONE 3.

Competitor ...	Cash, F. C.	Hughes, J. R.	Jones, J. S.	O'Loughlan M. J.	Thomas, T.	Jones, A.
Years Cropped	Third crop	Old land worked on three-year rotation	Second crop	Third crop	Tenth crop	Fourth crop
Timber ...	Salmon Gum, Gimlet and Morrell, Sandy Loam	Salmon Gum and Gimlet	Light sand-plain to light Mallee	Light scrub and Tea-tree, good quality	Light country scrub, Jam and Tamma: occasional York Gum	Mainly Gimlet and white Mallee
Ploughed ...	Early August	July	July	June and July	Last week in July to end of August	July
Type of Plough	Disc	Mouldboard	Mouldboard	Disc	Disc	Disc
Depth ...	3 in–4in.	4in.	2½in.	3in–3½in.	3in.	3½in.–4in
Condition of land at time of ploughing	Good	Fairly good	Favourable	Good	Good	Good
Other cultivations	Springtyne cultivated twice in September	Disced 2in. deep in September and again in May. Drilled with a Combine and growing crop rolled and harrowed	Springtyne cultivated in September and again in March. Drilled with a combine followed by heavy harrows	Crossed with Springtyne cultivator first week in October and again prior to seeding Drilled with a Combine	Disced with a sundercut immediately prior to drilling	Harrowed twice and disced with a Sundercut 2in. deep during Spring. Again with a Sundercut in April and drilled with a Combine
Variety ...	Merredin ...	Nabawa	Nabawa	Merredin	Nabawa	Nabawa
Planted ...	Early May	3rd and 4th week in May	1st week in June	2nd or 3rd week in May	Last week in April to end of May	First week in May
Rate of Seed	45	45	60	75	40	55
Graded ...	Recleaned	Yes	Yes	Recleaned	Yes	Yes
Treated ...	Dry pickled	Dry pickled	No	Pickled with bluestone	Pickled with bluestone	Dry pickled
Rate of Super	100	100	90	120	100	100
Disease ...	Slight infection with Flying Smut, Ball Smut and Flag Smut	Trace of Ball smut and Flying smut. Small patches of Take all	Traces of Ball and Flying Smuts	Flag Smut and trace of Flying Smut	Slight infection with Take-all	Trace of Ball Smut

GOOMALLING AGRICULTURAL SOCIETY.

Of the five entries received through the above Society, four competitors submitted crops for inspection.

The points awarded were set out as hereunder:—

TABLE 9.

GOOMALLING AGRICULTURAL SOCIETY.

ZONE 3.

Judge: A. S. Wild, Agricultural Adviser.

Competitor.	Society.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Sawyer, T. G.	Goomalling ...	Nabawa ...	30	18	12	13	8	81
French, E. D.	Goomalling ...	Nabawa ...	20	17	14	13	8	72
Anstey & Sheen	Goomalling ...	Nabawa ...	20	16	13	13	7	69
Waterhouse, F. W.	Goomalling ...	Caliph ...	18	18	13	13	7	68

Mr. T. G. Sawyer's crop of "Nabawa" secured first place with the creditable calculated yield of 30 bushels per acre. This was an attractive looking, well headed crop, which was unfortunately marred by the prevalence of Ball Smut, this appreciably reducing the yield. In addition, there were small patches of Takeall. The crop, however, was, with the exception of a few plants of mustard, canary grass and oats, comparatively clean of weeds and was very even in growth.

The admixture was confined to a few heads of barley and strange varieties of wheat.

The Goomalling Agricultural Society is to be congratulated on this, its entry into the Competition. It is hoped that the future may show more entrants from this district and a consequent participation in the benefits derived from the same.

The rainfall as officially recorded at Goomalling during the year is set out hereunder:—

——	Jan.	Feb.	Mar.	Apl.	Useful Rains.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
Goomalling	98	...	46	45	157	138	378	144	90	29	936	8	114	1,247

The details of the methods adopted by the Competitors are as hereunder:—

TABLE 10.

GOOMALLING DISTRICT CROP COMPETITION.

ZONE 3.

Competitor ...	Sawyer, T. G.	French, E. D.	Anstey & Sheen.	Waterhouse F. W.
Years cropped ...	Fourth crop ...	Sixteenth crop ...	Over 20 years cropped	Second crop
Timber	Morrell, Salmon Gum, York Gum, first class loam	Jam and York Gum and some Gimlet	Salmon Gum, York Gum	Sheoak, Jam, little York Gum
Ploughed	July and August	August	End July early August	Ju'y
Type of plough ...	Mouldboard	Mouldboard	Mouldboard	Disc
Depth	4in.	4in.	4in.	4in.
Condition of land at time of ploughing	Good	Good	Good	Good
Other cultivations	Springtyne cultivated in March. Drilled with a combine	Springtyne cultivation prior to drilling with a disc drill with drag harrows. Part rolled before drilling	Part Springtyne cultivated in September and whole prior to seeding. Part rolled just after seeding	Disced 4in. deep immediately prior to seeding
Variety	Nabawa	Nabawa	Nabawa	Caliph
Planted	May	24th May	Mid-May	1st fortnight in June
Rate of seed ...	64	60	75	60
Graded	Yes	Recleaned	Recleaned	Recleaned
Treated	Wet pickled	Dry pickled	Dry pickled	Dry pickled
Rate of Super. ...	100	90	90	140
Disease	Trace Take-all and some Bunt	...	Trace of Take-all	Traces of Ball Smut and Flying Smut

WONGAN HILLS AGRICULTURAL SOCIETY.

The above Society conducted a double competition, two classes of land, heavy and light, determining the distinction. For the purposes of zone competitions all the crops were judged as being in the one class. The awards made are as hereunder:—

TABLE 11.

WONGAN HILLS AGRICULTURAL SOCIETY.

ZONE 3.

Judge: A. S. Wild, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Bryan, P. A.	Wongan Hills	Nabawa ...	29	18	14	13	8	82
Slater, W. G....	Wongan Hills	Nabawa ...	27	18	13	13	9	80
Ackland, R. B.	Wongan Hills	Merredin ...	26	18	13	14	8	79
Martin, P. ...	Wongan Hills	Nabawa ...	23	19	14	13	8	78
Ackland, J. H.	Wongan Hills	Nabawa ...	24	18	13	14	8	77
Gorman, P. W.	Wongan Hills	Nabawa ...	24	18	13	12	9	76
Mt. Rupert Estate	Wongan Hills	Ford ...	22	18	13	13	8	74
Booth, W. J. ...	Kokardine ...	Nabawa ...	21	18	13	13	8	73
Herbert Bros.	Wongan Hills	Wilfred ...	18	19	13	12	8	70
Leeson, P. W.	Wongan Hills	Nabawa ...	15	19	14	13	7	68
Parker, C. A. ...	Wongan Hills	Nabawa ...	16	15	13	13	7	64

Mr. P. A. Bryan and Mr. W. G. Slater, each with the variety "Nabawa" secured first and second place respectively. The winning crop was planted during the fourth week in May at the rate of 44 lbs. per acre with an application of 84 lbs. per acre of superphosphate. The land, which produced this clean, even crop, had been ploughed during the previous June and July. The calculated yield was 29 bushels.

Mr. Slater's crop was also an early fallowed land which had been treated with 100 lbs. of superphosphate per acre. This was also very even in growth, well stooled and headed and comparatively free from weed growth and admixture.

The rainfalls as recorded at Wongan Hills and Kokardine are as hereunder:—

	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Wongan Hills	45	...	44	90	106	110	251	157	97	42	763	...	81	1,023
Kokardine	62	2	24	19	164	91	280	167	79	46	827	6	23	963

The cultural details as employed by the competitors are as set out in the table hereunder:—

TABLE 12

WONGAN HILLS DISTRICT CROP COMPETITION.

ZONE 3.

Competitor	Bryan, P. A.	Slater, W. G.	Ackland, R. B.	Martin, P.	Ackland, J. H.	Gorman, P. W.
Years cropped	2nd crop	1st crop	9th crop	2nd crop	About tenth crop	2nd crop
Timber ...	Salmon Gum, Gimlet and Yorrell	York Gum and Jam	Salmon Gum and Yorrell	Sand plain, smoke-bush and tussocks	Salmon Gum, Gimlet and a little Morrell	Tamma scrub plain
Ploughed ...	Middle June to middle July	End of June. Early July	July	August	June	Late July
Type of plough	Mouldboard	Disc	Disc	Disc	Mouldboard	Disc
Depth ...	3½ to 4 inches	3½in.	3½in.	3½in.	3½in. to 4in.	4in. to 5in
Condition of land at time of ploughing	Good	Good	Very good	Good	Ideal	Good
Other cultivations	Cultivated with Springtyne duck-foot machine early in Sept. and late in Oct., and again immediately before drilling	Disc cultivated 2in. deep prior to seeding and light harrows dragged behind drill	Springtyne cultivated in August, again Sept. and again in April. Planted with a combine drill with drag harrows	Ploughed back early in Oct. Disc cultivated before seeding	Spring-tyne cultivated twice in spring and twice after the first rains in 1928. Drilled in with a combine	Springtyne cultivated in March. Drag harrowed when drilling
Variety ...	Nabawa	Nabawa	Merredin	Nabawa	Nabawa	Nabawa
Planted ...	23rd to 30th May	12th to 20th April	End of May and beginning June	25th May	18th to 21st May	Middle of May
Rate of seed	44lbs.	60lbs.	50lbs.	45lbs.	55lbs.	60lbs.
Graded ...	Yes	Yes	Yes	Yes	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Seed treated for the previous year	Dry pickled	Dry pickled	Dry pickled
Rate of Super	84lbs.	100lbs	123lbs.	112lbs.	114lbs.	120lbs.
Disease ...	...	Traces Rust, Septoria and Flying smut	Flag smut	...	Small patches of Take-all	Traces of Take-all and Septoria

TABLE 12, ZONE 3—*continued.*

WONGAN HILLS DISTRICT CROP COMPETITION—*continued.*

Competitor	Mt. Rupert Estate.	Booth, W. J.	Herbert Bros.	Leeson, P. W.	Parker, C. A.
Years cropped	Eight years	Fourth crop	First crop	First crop	Cropped about fifteen years
Timber ...	Salmon Gum, Gimlet and Morrell	Gimlet and Salmon Gum	Sand plain, odd patches of stunted mallee	Tea-tree, sandy soil	Salmon Gum, Gimlet and Morrell
Ploughed ...	July	August	July	July and August	July
Type of Plough	Disc	Mouldboard	Disc	Disc	Mouldboard
Depth ...	4in.	4½in.	3in.	3in. to 4in.	3in. to 3½in.
Condition of land at time of ploughing	Dry	Good	Good	Good	Good
Other cultivations	Springtyne cultivated in August, harrowed in Sept. and again in Mar. Drilled with a combine	Not cultivated prior to seeding with a combine	Ploughed back beginning May to about 2in. to 3in. and drilled	Tandem disc, cultivated 2in. deep prior to drilling	Springtyne cultivated twice in Sept. Harrowed at the end of Feb. after rain
Variety ...	Ford	Nabawa	Wilfred	Nabawa	Nabawa
Planted ...	2nd week in May	Mid-May	15-20th May	End of April Early May	Middle of May
Rate of seed	60lbs.	60lbs.	60lbs	60lbs.	65lbs.
Graded ...	Yes	Yes	Recleaned	Yes	Yes
Treated ...	Dry pickled ...	No	Dry pickled	Dry pickled	Dry pickled
Rate of super.	110lbs.	90lbs.	105lbs.	120lbs.	120lbs.
Disease ...	Flag Smut. Trace Ball Smut	Trace Ball Smut	Trace of Septoria. Trace Ball Smut.	...	Take-all. Trace Ball Smut

WYALKATCHEM AGRICULTURAL SOCIETY.

Ten competitors submitted their crops for inspection in the competition of the Wyalkatchem Agricultural Society.

The awards made were as hereunder:—

TABLE 13.

WYALKATCHEM AGRICULTURAL SOCIETY.

ZONE 3.

Judge: A. S. Wild, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Whittingham, T. M.	Nalkain ...	Merredin ...	22	18	14	14	9	77
McKay, N. ...	Benjabbering	Merredin ...	23	18	14	13	8	76
Threlfall, G. H.	Korrelocking...	Nabawa ...	21	18	14	14	8	75
Tyler, J. E. ...	Korrelocking...	Merredin ...	20	18	14	14	8	74
Ferries, H. G. ...	Wyalkatchem	Nabawa ...	21	18	13	12	8	72
Harrison, L. & Sons	Benjabbering	Gresley ...	22	17	13	13	7	72
Payne, Mrs. ...	Korrelocking	Nabawa ...	17	19	14	14	8	72
Grace, W. H.	Wallambin ...	Nabawa ...	20	16	12	12	8	68
Lehman, C. E.	Cowcowing ...	Gluyas Early	19	17	12	12	8	68
Allan, A.	Korrelocking	Nabawa ...	15	15	12	12	7	62

Between many of the crops inspected, there was but little to choose. Mr. T. M. Whittingham of Nalkain, who secured first place, although not having the highest calculated yield, gained points for freedom from disease and admixture, and evenness of growth.

In view of the climatic conditions of 1928 it cannot be expected that this district should be as successful as it was the previous year. Notwithstanding this, however, the crops were well worthy of the competition.

The rainfall as officially recorded at Wyalkatchem, Korrelocking, Benjabbering, Cowcowing, Wallambin and Nalkain was:—

	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Wyalkatchem	56	...	128	12	91	131	297	200	96	28	843	8	6	1,053
Korrelocking	35	...	113	8	97	138	297	159	93	26	810	7	76	1,049
Benjabbering	50	...	62	9	97	85	301	209	85	19	796	19	...	...
Cowcowing	112	...	35	40	110	73	292	174	64	27	760	4	70	1,021
Wallambin	85	...	43	47	87	55	256	123	45	22	588	8	74	845
Nalkain	69	...	30	44	102	81	315	125	60	20	703	...	...	...

The cropping details of the crops inspected are as hereunder:—

TABLE 14.

WYALKATCHEM DISTRICT CROP COMPETITION.

ZONE 3.

Competitor ...	Whittingham, T. M.	McKay, N.	Threlfall, G. H.	Tyler, J. E.	Fenie, H. G.
Years cropped	About 10 years	...	Fifth crop	Eighth crop	Fifth crop
Timber ...	Mixed loam. Salmon Gum. York Gum and Gimlet	Salmon Gum. Gimlet and Tea-tree	Mixed Mallee and Gimlet with little Salmon Gum	York Gum, Jam and Mallee, Gimlet and Salmon Gum	Mallee, light scrub and Pear plain
Ploughed ...	July	End of August	June	June	End of June and early July
Type of plough	Disc	Disc	Mouldboard	Mouldboard	Mouldboard
Depth ...	4½in.	3in.	3½in to 4in.	4in.	4 to 4½in.
Condition of land at time of ploughing	Good	Good	...	Very good	Good
Other cultivations	Disced 3in. deep in Sept., and Springtyned cultivated before seeding	Skim-ploughed early in Sept., Springtyned cultivated prior to seeding and harrowed immediately after seeding	Scarified three times up to early October. Harrowed at the end of March and drilled with a combine	Turned back with disc in August 2in. deep. In Sept. cultivated with springtyne implement followed by harrows. Harrowed in Oct. and Springtyne cultivated prior to seeding. Drilled with combine followed by light roller	Disced 3in. deep early in Sept., and Springtyne cultivated with duckfoot points at the beginning of Oct. Drilled with combine
Variety ...	Merredin	Merredin	Nabawa	Merredin	Nabawa
Planted ...	Middle to end of May	1st week in June	27th April to 1st May	25th April	1st week in May
Rate of seed...	60lbs.	60lbs.	50lbs.	60lbs.	60lbs
Graded ...	Yes	Yes	Yes	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	No
Rate of super.	60lbs.	90lbs.	110lbs.	125lbs.	100lbs.
Disease ...	Trace of Flying Smut	Trace of Flying Smut	...	Trace of Flying Smut	Trace of Smut

TABLE 14, ZONE 3—*continued.*

WYALKATCHEM DISTRICT CROP COMPETITION *—continued.*

Competitor ...	Harrison, L., & Sons.	Payne, Mrs.	Grace, W. H.	Lehman, C. E.	Allan, A.
Years cropped	Fourth crop	Third crop	Cropped for 18 years	Sixth crop	Eighth crop
Timber ...	Salmon Gum and Gimlet, Jam running to Wodgil	Scrub land, sandy with small patch of heavy land	Pure Gimlet	Mainly Salmon Gum and Gimlet	Salmon Gum and Gimlet with some Mallee
Ploughed ...	June	1st week in Aug.	July	July	July
Type of plough	Disc	Disc	Disc	Mouldboard	Mouldboard
Depth ...	3in.	4in.	4in.	4in.	3½in. to 4in.
Condition of land at time of ploughing	Good	Good	Good generally	Good	Good
Other cultivations	Redisced 2in. deep in Sept. Springtyne cultivated prior to seeding.	Cultivated with a springtyne implement end of Sept. Drilled with a combine	Springtyne cultivated in Sept. Drilled with combine	Two springtyne cultivations in Sept. with one harrowing and drilled with a combine	Disced to 2½in. deep during October; cultivated in Feb. and drilled with a combine
Variety ...	Gresley	Nabawa	Nabawa	Gluyas Early	Nabawa
Planted ...	2nd week in April	Middle April	3rd week in May	26th May	1st week in May
Rate of seed ...	45lbs.	45lbs.	45lbs.	57lbs.	50lbs.
Graded ...	Recleaned	Yes	Yes	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of super.	90lbs.	120lbs.	75lbs.	80lbs.	90lbs.
Disease ...	Slight infection of Flag and Flying Smuts	...	Trace of Flying Smut with patches of Take-all	Fair amount of Ball Smut; little Flag Smut	Take-all.

Zone 4.

Judge: G. L. THROSSELL, (Dip. Agric.), Agricultural Adviser.

Entries in Zone 4 were received through the Mt. Marshall and Nungarin Agricultural Societies. Since the crop competition conducted by the Nungarin Agricultural Society was subsequent to a fallow competition, certain farmers in the district who had not entered in the Society's Fallow Competition found it necessary to enter direct with the Royal Agricultural Society.

MT. MARSHALL DISTRICT AGRICULTURAL SOCIETY.

Four entries were received for this competition, but of these only two submitted their crops, one competitor having withdrawn and the other commenced stripping.

The points were awarded as hereunder:—

TABLE 15.

MT. MARSHALL DISTRICT AGRICULTURAL SOCIETY.

ZONE 4.

Judge: Gerald L. Throssell, Agricultural Adviser.

Competitor.	District.	Variety.	Estimated Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Dunkley, G. A.	Yelbeni ...	Gluyas Early	22	19	13	14	9	77
Hopwood, H. W. C.	Bencubbin ...	Gluyas Early	17	18	14	12	8	69

The winning crop, submitted by Mr. G. A. Dunkley of Yelbeni was of the variety Gluyas Early. The land originally carried Gimlet, Mallee and Tea-tree timber, and had been cropped since 1912. The fallowing was done in July to a depth of 4in. with a mouldboard plough and received three cultivations, all with the Springtyne implement. The first was in September, to the full depth of ploughing, another after rain in November and a final stroke before seeding—the last two cultivations being shallower. The crop was planted with a combined cultivator and drill during the third week in May with 60 lbs. of graded seed, and 120 lbs. of Superphosphate per acre.

This crop, which gained 77 points, was calculated to yield 22 bushels per acre. It was very dense and considering the season, had made very good growth. Although the seed had not been pickled, it was free from Bunt, but there was a trace of both Flag Smut and Take-all. The crop was very true to type, the only admixture found being a trace of barley. The little unevenness was due to a few sandy pockets.

Mr. B. W. G. Hopwood of Bencubbin gained second place with 69 points, with a crop of Gluyas Early which was calculated to yield 17 bushels per acre.

The land has carried eleven crops since 1911. The original timber was mainly Gimlet, verging into Tea-tree. Fallowing operations were carried out in August, the land being ploughed to a depth of 4in. with a mouldboard plough, after which no further cultivation was done until March when a disc cultivator was used to break down the clods. Seeding took place during the middle of May—a "combine" being used. The seed, which was both graded and dry pickled, was sown at the rate of 45 lbs. per acre, and Superphosphate at 100 lbs. per acre.

On account of a shortage of green feed, Mr. Hopwood was forced to feed his crop off heavily with sheep during the month of July. Under these circumstances it is remarkable that despite the very adverse season, the crop did so well. The crop was rather thin and patchy. It was free of "Take-all" but was slightly affected by the Smuts—Flag Smut, Loose Smut and Bunt. The weeds, which were mainly growing on hard patches, were Mustard and Potato weed.

The rainfall recorded by the Competitors for 1928 to end of October is as follows:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total, May to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.	
G. A. Dunkley, Yelbeni	...	...	100	...	161	78	239	217	82	14	790
B. W. G. Hopwood, Bencubbin	75	...	37	85	120	43	251	123	51	24	612

The winning crop received nearly two inches more rain than the other, but both had very critical periods in June, September and October. This light rainfall towards the end of the growing period was spread over too many days to be of much benefit to the growing crop. However the cool weather towards maturity minimised to some extent the formation of pinched grains:—

The following table summarises cultural methods adopted by the competitors:—

TABLE 16.

MT. MARSHALL CROP COMPETITION.

ZONE 4.

Competitor	G. A. Dunkley.	B. W. G. Hopwood.
Years cropped	Since 1912—about 11 crops	Since 1911—about 11 crops
Rotation	2 years fallow-crop	2 years fallow-crop
Timber	Gimlet, Mallee and Tea-tree	Gimlet verging into Tea-tree
Ploughed	Middle July	August
Type of plough	Mouldboard	Mouldboard
Depth	4ins.	4in.
Condition of land at time of ploughing	...	...
Other cultivations	Springtyned to depth of ploughing in September, after rains in November and before seeding	Cultivated in March with a double gang disc
Variety	Gluyas Early	Gluyas Early
Planted	3rd week in May	Middle May
Type of drill	Combine	Combine
Rate of seed	60lbs.	45lbs.
Graded	Yes	Yes
Treated	No	Yes—dry pickled
Rate of super.	120lbs.	100lbs.
Fed off	No	Very heavily in July
Age of seed	3rd year from Merredin	3rd year from Merredin
Disease	Trace of Flag Smut and Bunt Take-all	Trace of Flag and Loose Smuts

NUNGARIN-EASTERN DISTRICTS AGRICULTURAL SOCIETY

Fifteen entries were received for the Nungarin-Eastern Districts Agricultural Society Crop Competition. As a result of the adverse season, however, ten withdrew.

The season has been a very trying one for farmers generally. There were no spring and summer rains and the autumn rains were very light. The lateness of the seeding rains delayed germination for some time after seeding. Consequently the crops were much later and the weed growth more prolific. The falls of rain during the winter were generally very light, only one or two good soaking rains being experienced. The season finished off very quickly, with little or no rain worth speaking about during the months of September or October. Cool weather prevailed during the ripening period and minimised to some extent the formation of pinched grain. It was indeed gratifying to note how well the competitors' crops were stripping.

The rainfall for the years up to the end of October was as follows:

	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total, May to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.	
Talgomine ...	39	...	83	86	69	58	217	139	49	19	546
Kwelkan	49	...	65	98	108	93	328	206	83	18	836
Mangowine ...	70	...	63	78	102	39	209	139	62	11	562

The points awarded to the competitors are set out in the following table: —

TABLE 17.

NUNGARIN AND EASTERN DISTRICTS AGRICULTURAL SOCIETY.

ZONE 4.

Judge: G. L. Throssell, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Young, G. T. ...	Talgomine ...	Gluyas Early	24	19	14	15	8	80
Creagh Bros. ...	Kwelkan ...	Nabawa ...	22	18	14	14	9	77
Williams, F. A.	Mangowine ...	Gluyas Early	20	17	10	14	9	70
Dumsday, L.	Talgomine ...	Nabawa ...	16	17	14	14	7	68
Johnson, J. R.	Mangowine ...	Nabawa ...	16	17	12	14	7	66

Mr. G. T. Young of Talgomine won the competition with a crop of "Gluyas Early," calculated to yield 24 bushels per acre. It was sown on July fallow on 20th May with a disc drill. The seed was sown and super was applied at 45 lbs. and 95 lbs. respectively. This entry was a very fine crop, true to type, very free of weeds and disease, and its only apparent defect was its unevenness—caused by crabholes.

Messrs Creagh Bros. were awarded second place with a crop of "Nabawa" calculated to yield 22 bushels per acre. It was sown on July fallow on 19th and 20th April with 40 lbs. of seed and an application of one cwt. of Superphosphate per acre. This crop has stooled well and had made good growth. It was a little uneven and weeds were fairly evident in patches. It was not as true to type as the winning entry, there being a few heads of other varieties present. A slight infection of Take-all was noticed.

The cultural methods of all competitors are summarised below:—

TABLE 18.

NUNGARIN-EASTERN DISTRICTS CROP COMPETITION.

ZONE 4.

Competitor ...	G. T. Young.	Creagh Bros.	F. A. Williams.	L. Dumsday.	J. H. Johnson.
Years cropped	4 crops	Since 1911	5 crops	...	...
Rotation ...	2 years fallow-crop	3 years fallow, crop and stubble	2 years fallow-crop	...	2 years fallow-crop
Timber ...	Salmon and Gimlet	Salmon and Gimlet	Salmon and Gimlet	Gimle and Tea-tree	Salmon and Gimlet
Ploughed ...	July	Mid-July	July	July	End June
Type of plough	Mouldboard	Disc.	Mouldboard	Disc	Disc
Depth ...	3in. to 4in.	3in. to 4in.	4in.	3½in.	4in.
Condition of land at time of ploughing	...	...	...	...	...
Other cultivations	Skim ploughed in Sept. with a Sundercut. Springtyned & harrowed in March, again in April. Harrowed after drilling	Skim ploughed in October	Harrowed in August. Duck foot scarified in Sept.	Scarified in August. Harrowed in November	Sundercut in August, and second week in February.
Variety ...	Gluyas Early	Nabawa	Gluyas Early	Nabawa	Nabawa
Planted ...	20th May	25th–26th April	3rd week May	19th–20th April	1st week May
Type of Drill...	Disc	Combine	Combine	Combine	Combine
Rate of seed ...	45lbs.	45lbs.	45lbs.	40lbs.	45lbs.
Graded ...	Yes	Yes	Yes	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of super.	90lbs.	90lbs.	60lbs.	112lbs.	80lbs.
Disease ...	Trace of Flag Smut and Bunt	Take-all	Flag Smut very bad. Trace of Take-all	Take-all	Take-all

ROYAL AGRICULTURAL SOCIETY.

As explained previously three competitors from the Nungarin and Eastern districts entered direct with the Royal Agricultural Society.

The points awarded these competitors are shown hereunder:—

TABLE 19.

ROYAL AGRICULTURAL SOCIETY.

ZONE 4.

Judge: G. L. Throssell, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Payne, H. ...	Nungarin ...	Merredin ...	22	19	14	12	8	75
Reynolds, A. G.	Mukinbudin ...	Gluyas Early	17	20	14	14	9	74
Richardson, J.	N. Mukinbudin	Nabawa ...	17	19	14	11	9	70

The winning crop of "Merredin," grown by Mr. H. Payne of Nungarin, was awarded 75 points and was calculated to yield 22 bushels per acre. The soil was of a nature suited to the season, being a mixture of Salmon Gum, Gimlet, Jam and Mallee. The land was ploughed in early July and received two workings in the spring, the first with a disc implement; the second with a springtyne cultivator. Seeding took place on May 20th, 50 lbs. of seed with 80 lbs. of superphosphate per acre being sown with a combined drill and cultivator. It was a very attractive looking crop, being well grown, dense and very free of weeds. However, it was rather uneven and contained a fair amount of admixture. It was free of Take-all and Bunt, but traces of both Flag and Loose Smuts were present.

Mr. A. G. Reynolds of Mukinbuddin gained second place with a nice crop of "Gluyas Early" on new land fallowed early in June of the previous year. It was sown on 16th May with 36 lbs. of seed and 92 lbs. of superphosphate per acre. Mr. Reynold fed this crop off very heavily with sheep towards the end of June and early July. This no doubt reduced the wheat yield but it enabled him to carry his sheep over a period when feed was very scarce. Being new land, the crop was free of weeds. It was very true to type, there being an odd admiture only. The only diseases present were traces of the Flag and Ball Smuts.

The season had been a very unfavourable one. June was well below the average and the rainfall during September and October fell in very light showers spread over a number of days. The winning crop received over an inch and a quarter more rain than that of the two other competitors. The rainfall recorded on the farms of the competitors is given below.

—.	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total. May to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.	
Nungarin	49	...	84	108	127	76	238	199	80	14	734
Muckinbudin ...	63	...	52	61	103	90	218	119	52	14	596
N. Mukinbudin ...	112	...	72	68	112	53	243	126	49	30	613

The cultural methods of the competitors are summarised in the following table:—

TABLE 20.

CROP COMPETITION.

ZONE 4

Competitor ...	H. Payne.	A. G. Reynolds.	J. Richardson.
Years cropped ..	Three crops	First crop	2nd crop
Timber	Salmon, Gimlet, Jam and Mallee	Gimlet, Salmon and Mallee	Salmon, Gimlet and Tea-tree
Rotation	...	New land—fallowed	Two years fallow—crop
Ploughed	Early July	Early June	June
Type of plough ...	Sundercut	Sundercut	Disc
Depth	4in.	3in.	4in.
Condition of land at time of ploughing	...	...	...
Other cultivations ...	Crossed with Sundercut end of August. Cultivated with Springtyne in October	Cultivated with a Springtyne to full depth end July. Cultivated with a Combine followed by harrows in October	Cultivated mid-August with Springtyne, again in March. Harrowed after seeding
Variety	Merredin	Gluyas Early	Nabawa
Planted	20th May	16th May	20th April
Type of drill ...	Combine	Combine	Combine
Rate of seed ...	50lbs.	38lbs.	45lbs.
Graded	Yes	Yes	Yes
Treated	Dry pickled	Dry pickled	No
Rate of super. ...	80lbs.	92lbs.	90lbs.
Disease	Trace of Flag and Loose Smut	Trace of Flag Smut and Bunt	Trace loose Smut

ZONE 5.

Judge: I. THOMAS, Superintendent of Wheat Farms.

In this Zone the Bruce Rock Doodlakine-Baandee and Merredin Agricultural Societies were represented. In addition one entry was received direct by the Royal Agricultural Society.

BRUCE ROCK AGRICULTURAL SOCIETY.

This Society provided for a fallow and crop competition of 50 acres in addition to one for crops only.

The awards made for the cropping section of the former are as follow:—

TABLE 21.

BRUCE ROCK AGRICULTURAL SOCIETY.

ZONE 5.

Awards for Crops in Crop and Fallow Competition.

Judge: I. Thomas, Crop Superintendent of Wheat Farms.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Mann, R. ...	Shackleton ...	Gluclub ...	23	18	14	13	8	76
Buller & Black	Babakin ...	Nabawa ...	23	18	14	13	8	76
Harling, H. H.	Belka ...	Nabawa ...	20	18	13	14	7	72
Smith, C. & SONS	Yarding ...	Gluclub ...	20	18	13	13	7	69

The crop submitted for inspection by Mr. R. Mann was of the variety "Gluclub" and was part of 180 acres of the same variety. It was planted during the last week of April at the rate of 60 lbs. of seed per acre. The seed had been recleaned and treated with copper carbonate. Superphosphate had been applied at the rate of 110 lbs. per acre. The crop was fairly well grown over the greater part of the area but it had not stooled evenly nor was it even in height. It was fairly free of weed growth and admixture, only a trace of barley being noticed. Except that Septoria was present, it was free of disease.

The 50 acres of crop submitted by Messrs. Buller and Black was part of 160 acres "Nabawa" and, like Mr. Mann's crop, with which it tied for first place, it was not regular in height or stooling, but was fairly free of weeds and disease. A little Take-all was noticed and a few plants of another variety were present. The seed which had been graded and pickled with copper carbonate was planted during the first week of June at the rate of 60 lbs. of seed with an application of 95 lbs. of superphosphate per acre.

The cultural details of the crops inspected are tabulated hereunder:—

TABLE 22.

BRUCE ROCK DISTRICT CROP AND FALLOW COMPETITION.

Competitor ...	Mann, R.	Buller & Black.	Smith, C., & Sons.	Harling, H. H.
Years cropped ...	Four	Four at least	Ten at least	Fourteen
Timber	Salmon Gum, Gimlet and Mallee	Jam, Gimlet, Salmon Gum, White Gum, Mallee and scrub	Salmon Gum and Gimlet	Salmon and Gimlet
Ploughed	End of July	July and August	June	July
Type of plough ...	Mouldboard	Sunderent	Mouldboard	Mouldboard and Disc
Depth	4in.	3in to 4in.	3in.	4in.
Condition of land at time of ploughing	Good	Good	Good	Good
Other cultivations	Cultivated with duckfoot scarifier in August, again Sept. with harrows attached. Planted with Combine	Cultivated with a duckfoot machine in Sept, again early in Oct. with harrows attached, and late portion harrowed	Sunderent in Aug. and again in Sept. Combine drilled	Cultivated during August, again in Sept. Drilled with a combine
Variety	Gluclub	Nabawa	Gluclub	Nabawa
Planted	3rd–4th week April	1st week June	Early in May	20th–25th May
Rate of seed ...	60lbs.	60lbs.	48lbs.	45lbs.
Graded	Recleaned	Yes	Yes	Yes
Treated	Dry pickled	Dry pickled	Dry pickled	No
Rate of super. ...	110lbs.	95lbs.	88lbs.	100lbs.
Disease	Traces of Septoria	Trace of Take-all	Take-all and a trace of Flag Smut	Ball Smut and Take-all

The awards made in connection with the crop competition conducted by the same society are as hereunder:—

TABLE 23.

BRUCE ROCK AGRICULTURAL SOCIETY.

ZONE 5.

Judge: I. Thomas, Superintendent of Wheat Farms.

Name.	Address.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total
			40 points.	20 points.	15 points.	15 points.	10 points.	100 points
Strange, P. A.	Yarding ...	Gluclub ...	25	19	13	14	8	79
Smith, C. & Sons	Yarding ...	Gluclub ...	25	18	13	14	8	78
Faulkner, D. H.	Babakin ...	Gluclub ...	23	18	13	14	9	77
Mann, R. ...	Shackleton ...	Gluclub ...	23	18	14	13	8	76
Foss, I. & J. S.	Ardath ...	Nabawa ...	20	19	14	13	8	74
Harling, H. H.	Belka ...	Nabawa ...	19	18	13	14	7	71
Starcevich, J....	Korbel ...	Nabawa ...	16	18	13	13	7	67

The crop submitted by the winner, Mr. P. A. Strange, was 50 acres part of 110 acres of the variety "Gluclub." It had been planted during the first week in May with 50 lbs. of seed treated with copper carbonate. There

was but little weed growth or admixture, and the crop was also fairly free of disease, only a trace of Take-all and Flag Smut being observed.

The crop of Messrs Chas. Smith and Sons was awarded second place. It was also of the variety "Gluclub." It was planted during the early part of May with 48 lbs. per acre of graded seed treated with copper carbonate for the prevention of smut. 88 lbs. of superphosphate were applied per acre. The crop was very free of admixture but black oats and mustard were conspicuous. Flag Smut was noticed and Take-all occurred in patches.

The rainfalls as recorded at the nearest official recording stations to the competitors were:—

	Jan.	Feb.	Mar.	Apl.	Useful Rains.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
Shackleton	118	...	74	49	114	104	433	200	128	22	1,001	2	28	1,272
Babakin	26	...	25	17	129	56	403	171	69	30	858	7	2	935
Belka ...	25	6	87	25	143	80	330	133	87	27	800	...	63	1,009
Yarding	67	...	47	8	103	79	333	142	111	23	791	6	67	986
Ardath ...	63	...	54	13	119	90	381	163	117	39	909	1	27	1,067
Korbel ...	60	...	102	53	110	88	277	242	90	23	830	...	55	1,100

The methods of cultivation adopted by the various competitors are summarised hereunder:—

TABLE 24.

BRUCE ROCK DISTRICT CROP COMPETITION.

Competitor ...	Strange, P.H.	Smith, C. & Sons.	Faulkner, D. H.	Mann, R.
Years cropped ...	Three	Ten at least	Five	Four
Timber	Salmon Gum and Gimlet	Salmon Gum and Gimlet	Salmon Gum, Gimlet, little Jam and scrub	Salmon Gum, Gimlet and Mallee
Ploughed	July	July	July and August	End of July
Type of plough ...	Sundercut	Mouldboard	Mouldboard	Mouldboard
Depth	3½in. to 4in.	3in.	3in.	4in.
Condition of land at time of ploughing	Good	Good	Good	Good
Other cultivations	Disc cultivated in Sept. Planted with a Combine	Cultivated with Sundercut in August, again in Sept. Drilled with a Combine	Disced in October and Duckfoot scarified prior to seeding	Cultivated with scarifier in Sept
Variety ...	Gluclub	Gluclub	Gluclub	Gluclub
Planted	1st week in May	End of May	Third week in April	Third and fourth week in April
Rate of seed ...	50lbs.	48lbs.	45lbs.	60lbs.
Graded	Yes	Yes	Recleaned	Recleaned
Treated	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of super. ...	96lbs.	88lbs.	70lbs.	110lbs.
Disease	Traces of Take-all and Flag Smut	Flag Smut	Trace of Take-all also Flag Smut	A little Septoria

BRUCE ROCK DISTRICT CROP COMPETITION—*continued.*

Competitor ...	Foss, I and J. S.	Harling, H. H.	Starcevitch, J.
Years cropped ...	Second	Fourteen	Four at least
Timber	Mallee, scrub, broom and Tea-tree	Salmon and Gimlet	Salmon Gum, Gimlet, and little Mallee
Ploughed	August	July	August
Type of plough ...	State Disc	Mouldboard and disc	Mouldboard
Depth	4in.	4in.	4in.
Condition of land at time of ploughing	Good	Good	Setting hard
Other Cultivations...	Planted with a Combine	Cultivated during August and again in September. Drilled with a Combine	Disc cultivated in March and springtyne cultivated before seeding
Variety	Nabawa	Nabawa	Nabawa
Planted	2nd week May	20th–25th May	May
Rate of seed ...	55lbs.	45lbs.	60lbs.
Graded	Yes	Yes	Yes
Treated	No	No	Dry pickled
Rate of super. ...	140lbs.	100lbs.	80lbs.
Disease	Slight trace of Take-all and Smut	Ball Smut and Take-all	A little Take-all

DOODLAKINE-BAANDEE AGRICULTURAL SOCIETY.

Six competitors submitted their crops for inspection in the competition conducted by the above Society; the awards being as hereunder:—

TABLE 25.

DOODLAKINE-BAANDEE AGRICULTURAL SOCIETY.

ZONE 5.

Judge: I. Thomas, Superintendent of Wheat Farms.

Name.	Address.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Prowse, A. E. C.	Doodlakine ...	Gluyas Early	24	18	12	14	9	77
Barton & Son ...	Doodlakine ...	Gluyas Late	25	17	13	13	8	76
Mableson, H. H.	Baandee ...	Nabawa ...	20	19	13	13	9	74
Prowse Bros. ...	Doodlakine ...	Nabawa ...	20	19	14	13	7	73
Spillman, D. J.	Baandee ...	Nabawa ...	18	19	14	13	8	72
Spillman, J. W.	Baandee ...	Nabawa ...	16	19	14	13	9	71

Mr. A. E. C. Prowse was awarded first prize with a selected portion from 150 acres of "Gluyas Early" which was planted towards the end of May. The seed had been treated with copper carbonate and 90 lbs. of superphosphate applied per acre. It was very even in growth, contained but little admixture or weed growth, and the disease present was limited to traces of Ball Smut and Take-all.

Messrs. Barton & Sons' "Late Gluyas."
2nd Prize, Doodlakine-Baandee. Yield—25 bushels per acre.

A. E. C. Prowse's "Gluyas Early."

1st Prize, Doodlakine-Baandee. Yield—24 bushels per acre.

Messrs Barton and Sons secured second place with a crop of "Gluyas Late," calculated to yield 25 bushels per acre. Except for odd heads of barley it was fairly free of admixture, while the disease consisted of traces of Flag Smut and Take-all only.

The rainfalls as officially recorded at Doodlakine and Baandee were:—

	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Doodlakine	24	...	70	6	94	76	273	101	73	13	630	...	97	807
Baandee	9	...	87	9	87	53	244	165	49	...	...	...	...	...

The methods of cultivation adopted by the various competitors are summarised hereunder:—

TABLE 26.

DOODLAKINE-BAANDEE DISTRICT CROP COMPETITION.

Competitor	Prowse, A. E. C.	Barton & Son.	Mableson, H. H.	Prowse Bros.	Spillman, D. J.	Spillman, J. W.
Years cropped	Three	Ten at least	Nine	Three	First year	Three or four
Timber ...	Salmon Gum, Gimlet and little Mallee	Gimlet, Salmon Gum and Tea-tree	Salmon Gum and Gimlet	Most Mallee	Light land, patches Gimlet, Salmon and White Gum	Tamma thicket
Ploughed ...	July and Aug.	June	June and July	July	August	August.
Type of plough	Mouldboard	Disc	Springtyne cultivator	Disc	Sundercut	Sundercut
Depth ...	3½in.	4in.	2in.	3½in.	3in.—4in.	4in.
Condition of land at time of ploughing	Good	Inclined to be wet	Inclined to be hard	Good	Good	Good
Other cultivations	Springtyne cultivated in August and planted with a Combine	Cultivated after ploughing, again during Sept. and first week in Feb. with scarifier. Cultivated and harrowed prior drilling	Cultivated with Duckfoot machine in Sept. Springtyne cultivated prior to drilling	Springtyne cultivated in August and planted with a Combine	Disced with a Sundercut in Apl. Planted with Combine	Cultivated prior to drilling
Variety ...	Gluyas Early	Gluyas Late	Nabawa	Nabawa	Nabawa	Nabawa
Planted ...	End of May	First week in April	Last week in April	Last week in April	Last week in April	Last week in April
Rate of seed	45lbs.	45lbs.	45lbs.	45lbs.	60lbs.	50lbs.
Graded ...	Yes	Yes	Yes	Yes	Yes	Recleaned
Treated ...	Dry pickled	Dry pickled	No	Dry pickled	Dry pickled	Dry pickled
Rate of super.	90lbs.	80lbs.-90lbs.	90lbs.	90lbs.	90lbs.-100lbs.	90lbs.
Disease ...	Trace Ball and Flag Smuts; also Take-all	Flag Smut and trace of Take-all	Trace of Ball Smut	...	Septoria in patches	...

MERREDIN AGRICULTURAL SOCIETY.

In this Society's competition nine crops were inspected. The awards were made as follows:—

TABLE 27.

MERREDIN AGRICULTURAL SOCIETY.

ZONE 5.

Judge: I. Thomas, Superintendent of Wheat Farms.

Name.	Address.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Smallacombe, H. A.	Merredin ...	Canberra ...	22	17	14	14	7	74
Maughan Bros.	Nukarni ...	Merredin ...	19	19	13	13	8	72
Hughes, J. ...	Merredin ...	Canberra ...	20	19	12	11	8	70
Priestly, J. ...	Merredin ...	Nabawa ...	20	16	13	14	7	70
Clothier, J. ...	Merredin ...	Nabawa ...	19	16	13	13	8	69
Hawke, W. L.	...	Gluyas Early	16	19	12	13	8	68
Dumsday, L. ...	Goomarin ...	Nabawa ...	16	17	14	14	7	68
Cummings, J. J.	Korbel ...	Merredin ...	19	16	13	12	7	67
Teasdale, H. W.	Korbel ...	Merredin ...	16	16	13	14	7	66

Mr. H. A. Smallacombe secured first place with 50 acres of "Canberra," calculated to yield 22 bushels per acre. This crop, which was planted during the first week in June at the rate of 60 lbs. per acre of seed treated with copper carbonate, and to which was applied 90 lbs. per acre of Superphosphate, was, with the exception of a few scattered wild oats, free of weeds. It was also fairly free of admixture and disease, a trace of Flag Smut only, being noticed. The crop was, however, somewhat uneven in height and stooling.

Messrs Maughan Bros.' crop of "Merredin" was awarded second prize. This was part of 90 acres planted during the middle of May at the rate of 45 lbs. per acre of seed with an application of 85 lbs. per acre of superphosphate. Although free of weeds, traces of Ball Smut and Flag Smut were present. A few heads of another wheat variety were noticed. Except in small patches the crop was even in height and stooling indicating uniform preparation.

The rainfalls as officially recorded at the recording stations nearest the different competitors are set out below:—

.....	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Merredin	48	...	117	77	94	125	221	160	64	27	691	...	97	1,030
Nukarni	17	...	96	84	119	78	202	191	56	28	674	4	46	921
Goomarin	84	...	51	80	121	83	182	163	79	18	646	12	35	908
Korbel ...	60	...	102	53	110	88	277	242	90	23	830	...	55	1,100

The cultural methods of the various competitors are tabulated hereunder:—

TABLE 28.

MERREDIN DISTRICT CROP COMPETITION.

ZONE 5.

Competitor...	Smallacombe, H. A.	Maughan Bros.	Hughes, J.	Priestley, J.	Clothier, J.
Years cropped	At least five	First	Three crops	At least twelve	Eight
Timber ...	Salmon and Gimlet to Mallee and White Gum	Salmon and Gimlet	Salmon Gum, Gimlet and Tea-tree	Salmon and Gimlet	Salmon Gum, Gimlet, little White Gum and scrub
Ploughed ...	August	June	May–June	June–July	June and early July
Type of plough	Sundercut	Sundercut	Disc and Mouldboard	Disc	Sundercut
Depth ...	3in.–4in.	3in.	4½in.	4in.	2½in.
Condition of land at time of ploughing	On the hard side in patches	Excellent	Good	On the wet side	Getting hard
Other cultivations	Disc cultivated in October. Springtyned prior to seeding	Springtyne cultivated during October and November	Springtyned July, August, and twice in September and again ahead of the Combine	Springtyned beginning of September. Rolled in September and harrowed. Cultivated with Tandem disc in March and Springtyned before seeding	Cultivated with Springtyne in Sept., part disc and part cross-cultivated in March. Planted with Combine
Variety ...	Canberra	Merredin	Canberra	Nabawa	Merredin
Planted ...	First week in June	15th May	5th May	Second week in April	Third week in May
Rate of seed...	60lbs.	45lbs.	52lbs.	50lbs.	45lbs.
Graded ...	No. Recleaned only	Yes	Yes	No	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of super.	90lbs.	85lbs.	140lbs.–150lbs.	80lbs.–90lbs.	90lbs.
Disease ...	A little Flag Smut	Traces of Flying Ball and Flag Smuts	Flag and Ball Smuts; trace of Take-all	Take-all	Take-all

TABLE 28, ZONE 5—*continued.*

MERREDIN DISTRICT CROP COMPETITION—*continued*

Competitor ...	Hawkes, W. L.	Dumsday, L.	Cummings, J. J.	Teesdale, H. W.
Years cropped	At least five	...	At least four	Eight or nine
Timber ...	Red Morrell	Gimlet and Tea-tree	Salmon Gum and Gimlet	Mainly Gimlet, little Salmon Gum
Ploughed ...	July	July	Last week in May and first week in June	August—September
Type of plough	Sundercut	Disc	Disc	Disc
Depth ...	3in.	3½in.	3½in.	3in.
Condition of land at time of ploughing	Good	...	Good	Hard
Other cultivations	Springtyned in March. Planted with Combine	Scarified in August; harrowed in November	Cultivated with a Duckfoot scarifier second week in August. Disc harrowed fourth week in September. Harrowed in March	Cultivated with a Duckfoot machine in September, during summer, and again prior to seeding with a Combine
Variety ...	Gluyas Early	Nabawa	Merredin	Merredin
Planted ...	...	19th and 20th April	5th May	3rd week in May
Rate of seed	45lbs.	40lbs.	55lbs.	45lbs.
Graded ...	No	Yes	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	No
Rate of super.	90lbs	112lbs.	80lbs.	90lbs.
Disease ...	Ball Smut and a trace of Flag Smut	Take-all.	Traces of Ball and Flag Smuts	Take-all in patches and Flag Smut scattered

Mr. J. Deane Hammond of Kellerberrin was the only competitor in this zone who entered direct with the Royal Agricultural Society. The points awarded were:—

Name.	Address.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Admixture. 15 points.	Freedom from Disease. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Hammond, J. D.	Kellerberrin ...	Carrabin ...	26	19	14	14	8	81

The crop submitted by this competitor was 50 acres of "Carrabin" being part of 60 acres of the same variety.

Except for a little capeweed, it was very free of weeds, and little or no admixture or disease was noticed. The growth was a little irregular but, being well grown and dense, the crop gave promise of high yields in large portions, although in others, also well grown, it had not stooled so well.

This crop was planted in May at the rate of 60 lbs. per acre of graded seed, treated with copper carbonate, 100 lbs. per acre of superphosphate being applied.

The monthly rainfall as officially recorded at Kellerberrin was:—

——	Jan.	Feb.	Mar.	Apl.	Useful Rains. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Kellerberrin	58	8	82	21	174	95	423	143	107	36	978	2	67	1,216

The details of cultivation are as set out hereunder:—

TABLE 29.

ROYAL CROP COMPETITION.

Competitor	J. Deane Hammond.
Years cropped	First
Timber	Mainly Gimlet: little Jam, York Gum
Ploughed	July—August
Type of plough	Mouldboard
Depth	3½in.
Condition of land at time of ploughing	Inclined to be dry
Other cultivations	Springtyne cultivated September. Planted with a Combine and harrowed immediately after
Variety	Carrabin
Planted	May
Rate of seed	60lbs.
Graded	Yes
Treated	Dry pickled
Rate of super.	100lbs.
Disease	—

Mr. J. Dean-Hammond's 50 acres "Carrabin."

Winner—Championship Prize, Zone 5. Yield—26 bushels per acre.

ZONE 6.

Judge: A. S. WILD, B.Sc. (Agric.), Agricultural Adviser.

No district Agricultural Society located in this Zone conducted crop competitions, the three entries being received by the Royal Agricultural Society.

The points awarded to the two crops submitted to the Judge for inspection are as hereunder:—

TABLE 30.

ROYAL AGRICULTURAL SOCIETY.

ZONE 6.

Judge: A. S. Wild, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Admixture. 15 points.	Freedom from Disease. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Richards, T. ...	South Caroling	Nabawa ...	25	18	14	14	8	79
Smith, H. D....	Beverley ...	Nabawa ...	24	17	14	14	8	77

Both crops were of the variety "Nabawa," that of Mr. Richards was calculated to yield 25 bushels per acre, whilst Mr. Smith's was calculated to yield 24 bushels per acre.

Mr. Richard's crop was planted at the end of May at the rate of 45 lbs. of graded, pickled seed per acre, with an application of 130 lbs. of superphosphate per acre on land which had been ploughed the previous June. This crop contained a few mustard and canary grass plants and odd plants of drake. The disease was limited to traces of Flying Smut and Take-all.

Mr. Smith's crop was also planted at the end of May at the rate of 45 lbs. of seed per acre with an application of 70 lbs. of Superphosphate per acre. Although comparatively free from admixture, it lost points for weed growth.

The rainfalls as officially recorded at Beverley and South Caroling during during 1928 were:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year.
Beverley	56	...	18	44	146	145	564	331	141	41	1,368	3	31	1,520
South Caroling	57	...	6	20	127	91	458	208	123	15	1,022	...	...	..

The details of the preparation of the land and of the cropping are as hereunder:—

TABLE 31.

ROYAL CROP COMPETITION.

ZONE 6.

Competitor	Richards, T.	Smith, H. D.
Years cropped	Cropped for 10 years	Third crop
Timber	Salmon Gum and Morrell	Jam and York Gum
Ploughed	End of June	End of August
Type of plough	Mouldboard	Mouldboard
Depth	4½in. to 5in.	4in.
Condition of land at time of ploughing	Good	Very good
Other cultivations	Springtyne cultivated twice in Spring and again twice in Autumn	Springtyne cultivated before seeding and Combine drilled
Variety	Nabawa	Nabawa
Planted	End of May	End of May
Rate of seed	45lbs.	45lbs.
Graded	Yes	Yes
Treated	Yes—Dry	Yes—Formalin
Rate of super.	130lbs.	70lbs.
Disease	Traces of flying Smut and Take-all	Trace Take-all

ZONE 7.

Judge: J. H. LANGFIELD, Manager, Experiment Farm, Merredin.

In this zone entries were received through the Kulin and Lake Grace Agricultural Societies.

KULIN AGRICULTURAL SOCIETY.

Nine crops were inspected in the competition of the above Society and all gave promise of good yields. The rainfall although below the average for the district was quite sufficient for the growing of good crops. The rainfall from the 1st January to 30th November, was 1303 points, and during the growing period, 1st May to 31st October, 997 points. The official rainfall as recorded at the Kulin Post Office was as follows:—

	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July	Aug.	Sept.	Oct.	Total.	Nov.	Dec.	Total for year
Kulin ...	108	3	16	155	149	89	365	223	100	71	997	24	49	1,352

The points awarded the various competitors are as follow:—

TABLE 32.

KULIN AGRICULTURAL SOCIETY.

ZONE 7.

Judge: J. H. Langfield, Manager Merredin Experimental Farm.

Competitor.	District.	Variety.	Estimated Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
F. S. Freebairn	Kulin ...	Queen Fan	26	19	14	14	8	81
Trotter, A. W.	Kulin ...	Hard Federation	26	18	14	14	8	80
Bowey, P. J....	Kulin ...	Ford ...	25	19	13	14	8	79
Roberts Bros....	Kulin ...	Hard Federation	22	19	14	14	8	77
Nichols, R. ...	Kulin ...	Nabawa ...	22	19	14	14	7	76
Evans, H. ...	Kulin ...	Queen Fan...	23	19	13	13	8	76
Johnston, H. ...	Kulin ...	Nabawa ...	23	18	14	13	7	75
Bowey, L. M. ...	Kulin ...	Merredin ...	20	19	14	14	8	75
Bowey & Baldock	Kulin ...	Nabawa ...	18	18	15	14	8	73

Mr. Freebairn secured first prize with a crop of "Queen Fan." It was fairly thick and well filled; the land had been well worked, this being reflected in the absence of weeds. It had been fed off with sheep until the end of July. There was very little disease or admixture.

Mr. Trotter's crop was Hard Federation, very well filled and when thrashed gave a nice bright sample of grain. It was very free from admixture or disease, and there were very few weeds.

Mr. P. J. Bowey's crop was the variety "Ford." It was fairly tall and well filled, but showed a fair amount of Flag Smut which, however, was the only disease noticed.

All the competitors dry-pickled their seed, and only in a few instances were traces of Ball Smut found. Ball Smut was noticed, however, to be rather prevalent in several crops that were not in the competition in spite of the fact that the seed had been treated with Copper Carbonate. In such cases, the failure is due, not to the inefficiency of the method itself, but rather to the methods of application. The efficiency of any method of treatment to prevent smut depends upon thoroughness; the success of the dry method necessitates the thorough dusting of the seed with copper carbonate powder. In many instances this fact is overlooked and the seed allowed to pass through the dusting chamber too quickly. Some farmers even consider that the mixing of the powder with the seed in the drill box is sufficient. This is a bad practice and one which it is wise to discontinue.

The methods of cultivation and other details are as follow:—

TABLE 33.

KULIN CROP COMPETITION.

ZONE 7.

Competitor ...	Freebairn, F. S.	Trotter. A. W.	Bowey, P. J.	Roberts Bros.	Nichols. R.
Years cropped	Four	Seven	Twelve	Six	Ten
Timber ...	Morrell and Salmon Gum	Jam and mixed forest	Salmon and Mallee	Salmon and Mallee	Salmon and Mallee
Ploughed ...	June	July	June	June	July
Type of plough	Mouldboard	Mouldboard	Duckfoot cultivator	Disc	Disc
Depth ...	4½in.	4in.	2½in.	3in.	4in.
Condition of land at time of ploughing	Good	Good	Good	Good	Good
Other cultivations	Cultivated and harrowed in August. Cultivated Sept. Harrowed Oct. Cultivated and harrowed in April	Cultivated Spring and before seeding	Cultivated in Spring only. Combined	Cultivated in Spring with disc and with Duckfoot before seeding	Cultivated Sept. Disc. cultivated Oct. Springtyne and before seeding
Variety ...	Queen Fan	Hard Federation	Ford	Hard Federation	Nabawa
Planted ...	10th May	Mid-May	1st May	End of May	End of April
Rate of seed	60lbs.	60lbs.	55lbs.	60lbs.	60lbs.
Graded ...	Winnowed ...	Yes	Yes	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of super.	112lbs.	90lbs.	90lbs.	90lbs.	70lbs.
Disease ...	Trace of Take-all	Trace of Take-all	Flag Smut	Trace of Flying Smut	Immature ears

Competitor ...	Evans, H.	Johnston, H.	Bowey, L. M.	Bowey & Baldock.
Years cropped	Seven	Five	Eighteen	Three
Timber ...	Salmon and Gimlet	York Gum and Morrell	Salmon and Mallee	Salmon, Mallee and Morrell
Ploughed ...	July	August	July	June
Type of plough	Mouldboard	Mouldboard	Duckfoot Cultivator	Duckfoot Cultivator
Depth ...	4in.	4in.	2½in.	2½in.
Condition of land at time of ploughing	Good	Good	Good	Good
Other cultivations	Cultivated September. Disc Springtyne March	Cultivated in Spring only. Combined	Duckfoot in September and before seeding	Duckfoot in September and Combined
Variety ...	Queen Fan	Nabawa	Merredin	Nabawa
Planted ...	1st May	May	Mid-May	End of May
Rate of seed ...	48lbs.	48lbs.	55lbs.	50lbs.
Graded ...	No	Winnowed	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of super.	90lbs.	90lbs.	90lbs.	75lbs.
Disease ...	Traces of Ball Smut and Flying Smut	Trace of Ball Smut	Trace of Flag Smut	...

LAKE GRACE AGRICULTURAL SOCIETY.

This is the first occasion on which this district has joined in the cropping competitions, and the Society must be congratulated on the very fine crops exhibited. Twelve crops were inspected and the general average was very creditable, the competing crops promising good yields, as also did the general average of the crops seen throughout the district.

The rainfall from the 1st January to 31st October was 1024 points, and over the growing period, viz., 1st May to 31st October, 921 points. This, although below the average for the district, must be considered satisfactory.

The official rainfall as recorded at Lake Grace during the year was as follows:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
Lake Grace	111	...	2	100	126	91	313	263	91	37	921	2	26	1,162

The points awarded to the various competitors are as follow:—

TABLE 34.

LAKE GRACE AGRICULTURAL SOCIETY.

ZONE 7.

Judge: J. H. Langfield, Manager Merredin Experiment Farm.

Competitor.	District.	Variety.	Estimated Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Stephens, F. ...	Lake Grace ...	Caliph ...	31	19	14	14	9	87
Bishop, H. ...	Lake Grace ...	Nabawa ...	25	19	14	14	8	80
Woodbury ...	Lake Grace ...	Yandilla King	25	18	14	14	8	79
Collinson & Fleay	Lake Grace ...	Gluyas Early	22	19	14	14	9	78
Harvey, J. F....	Lake Grace ...	Gluyas Late	24	17	13	14	8	76
Lay, — ...	Lake Grace ...	Nabawa ...	25	18	12	13	7	75
Coad, H. J. ...	Lake Grace ...	Baroota Wonder Early	23	18	14	13	7	75
Fry, E. ...	Lake Grace ...	Gluyas Early	22	18	13	14	8	75
Griffin, C. ...	Lake Grace ...	Merredin ...	21	18	15	13	7	74
Witham & Sons	North Biddy...	Gluyas Early	18	19	14	14	8	73
Darby, A. H.	Lake Grace ...	Gluyas Early	21	16	13	14	7	71
Lucas, — ...	Lake Grace ...	Yandilla King	19	17	13	14	7	70

The winning crop was 50 acres of "Caliph," entered by Mr. F. Stephens. It was very thick and even, very free of weeds, disease and admixture, and showed the result of careful farming. The land had been ploughed early in July, twice cultivated in spring and harrowed, and was worked with a Sundercut before seeding.

Mr. Bishop's crop was "Nabawa," the land being ploughed in early August with a disc implement (Sundercut) cultivated early in September and skim ploughed and harrowed at the end of September. The crop was very free from weeds, disease and admixture. The heads were well filled and the grain well developed. The only outstanding disease noticed in the crops in this district was Take-all. Little or no Flag Smut and very little

Ball Smut was encountered. In this instance the prevalence of Take-all must be attributed to the pioneering methods which are usually adopted in new districts, viz., continuous wheat for several seasons. This method of farming encourages the disease, and once it is firmly established it is very difficult to control. Farmers are realising the disabilities of wheat growing alone, and are making preparations for running sheep and growing oats. This will enable them to work in a definite rotation and should help considerably in controlling the disease.

The cultural methods adopted by the various competitors are as follow:—

TABLE 35.

LAKE GRACE CROP COMPETITION.

ZONE 7.

Competitor	F. Stephens.	Bishop, H.	Woodburn, -	Collinson & Fleay	Harvey, J. F.	Lay
Years cropped	Nine	Four	Five	First crop	Seven	Three
Timber ...	Salmon and Yorrell	Gimlet	Boree and Blackbutt	Blackbutt and Morrell	Blackbutt and Morrell	Gimlet
Ploughed ...	Early July	Early August	Late June	August	August	July
Type of Plough	Disc	Disc	Disc	Disc	Mouldboard	Disc
Depth ...	3½in.	3½in.	3½in.	3in.	3½in.	3in.
Condition of land at time of ploughing	Good	Good	Good	Good	Wet	Good
Other cultivations	Twice in Spring and harrowed. Sundercut before seeding. Sown with disc drill	September, and skim-ploughed and harrowed end of Sept. Sown with Combine	Springtyne in July. Sept. and Oct. and again before seeding. Sown with disc drill	...	Cultivated in Spring. Sown with Sundersseeder	Twice Sept. and sundercut before seeding.
Variety ...	Caliph	Nabawa	Yandilla King	Gluyas Late	Gluyas Early	Nabawa
Planted ...	May	May	Mid-April	Mid-May	May	May
Rate of seed	50lbs.	45lbs.	50lbs.	45lbs.	45lbs.	50lbs
Graded ...	Yes	Yes	No	No	No	Re-winnowed
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	Formalin	Dry pickled
Rate of super.	120lbs.	120lbs.	86lbs.	60lbs.	89lbs.	75lbs.
Disease ...	Trace of Flying Smut	...	Trace of Flying Smut	Ball Smut	Take-all	Take-all

TABLE 35, ZONE 7—*continued.*

LAKE GRACE CROP COMPETITION—*continued.*

Competitor	Coad, H. J.	Fry, E.	Griffin, C.	Witham & Sons	Darby, A. H.	Lucas, —
Years cropped	Five	...	Six	...	Fifteen	Seven
Timber ...	Morrell and Gimlet	Salmon and Morrell	Salmon Gum	Salmon and Gimlet	Salmon and Mallee	Salmon and Gimlet
Ploughed	July	July	June and July	...	July	Late July
Type of plough	Disc	Disc	Mouldboard	...	Mouldboard	Disc
Depth ...	3½in.	3in.	4in.	...	4in.	3½in.
Condition of land at time of ploughing	Wet	Good	Good	...	Wet	Wet
Other cultivations	Springtyned in Spring and sown with Combine	Twice in Spring with Sundercut	Springtyned in Spring and again before seeding	...	Disced in Sept. and Oct. Springtyned and harrowed before seeding. Sown with Combine	Sundercut in in Spring. Sown with Sunderseeder
Variety ...	Baroota Wonder Early	Gluyas Early	Merredin	Gluyas Early	Gluyas Early	Yandilla King
Planted ...	Mid-April	May	End May	...	1st May	End April
Rate of seed	45lbs.	45lbs.	60lbs.	...	45lbs.	50lbs.
Graded ...	Yes	Yes	No	...	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Formalin	...	Dry pickled	Dry pickled
Rate of super.	75lbs.	90lbs.	112lbs.	...	112lbs.	120lbs.
Disease ...	Trace of Flying Smut	Ball Smut	Trace of Ball Smut	...	Take-all	Take-all

ZONE 8.

Judge: A. S. WILD, B.Sc. (Agric.), Agricultural Adviser.

Three competitors in Zone 8 who submitted their crops for inspection entered direct with the Royal Agricultural Society. The remaining ten were entered in the Gnowangerup Agricultural Society's Crop Competition.

GNOWANGERUP DISTRICT AGRICULTURAL SOCIETY

All the ten entrants in the competition of the above Society submitted their crops for inspection:—

The awards made are as hereunder:—

TABLE 36.

GNOWANGERUP AGRICULTURAL SOCIETY.

ZONE 8.

Judge: A. S. Wild, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Parkinson, A. W.	Gnowangerup	Yandilla King	40	18	14	13	9	94
Davis, N. ...	Gnowangerup	Nabawa ...	39	18	14	14	8	93
Johnston, Alfred	Gnowangerup	Bena ...	36	18	14	14	9	91
McDonald, John	Gnowangerup	Nabawa ...	36	19	14	13	9	91
Milne, Malcolm	Borden ...	Nabawa ...	32	19	14	14	8	87
Ball, J. L. ...	Gnowangerup	Bena ...	31	18	14	13	8	84
Whyatt, C. A.	Pallinup ...	Drof ...	28	18	14	12	8	80
Murray, Gordon	Borden ...	Nabawa ...	26	18	14	13	8	79
Wright, E. H.	Pallinup ...	Bena ...	26	17	13	14	8	78
White, A. J. ...	Pallinup ...	Walkers ...	24	18	14	13	8	77

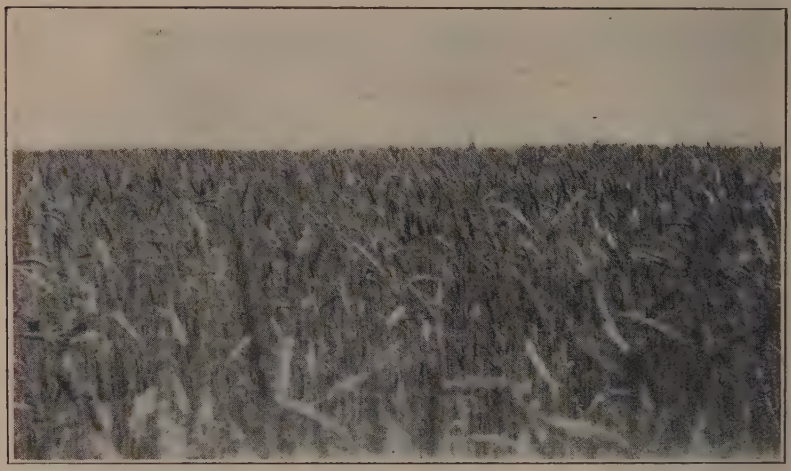
Mr. A. W. Parkinson again secured first place with the variety "Yandilla King." The continued success of this competitor with this late variety is worthy of special mention.

In spite of the seasonal rains cutting off short, the 50 acres inspected produced a calculated yield of 40 bushels. Although slightly "tipped" in places, the heads were well filled. Except for a few thistles, the crop was comparatively free of weeds and, with the exception of a little Flying Smut, of disease. Portion of the 50 acres had been planted with clean pedigreed seed from the Department's Experiment farms. This was free from admixture, but the balance, which had been planted with old seed had throughout, a proportion of barley, and heads of strange wheat varieties. The land had been fallowed during June and July of the previous year and had received subsequent treatment as shown in the accompanying table of cultural details. During the fallowing period and subsequently, sheep had been depastured on the land to assist in checking weed growth. This crop was sown during the 2nd and 3rd weeks in May at the rate of 45 lbs. of graded seed per acre with an application of 112 lbs. of superphosphate per acre.

Mr. N. L. P. Davis is to be congratulated on having obtained a calculated yield of 39 bushels per acre with the variety "Nabawa." The crop was well stooled and the heads well filled and free from disease. Points were lost for weed growth but, except for odd heads of barley, there was very little admixture. The seed had been sown at the rate of 45 lbs. per acre and the superphosphate applied at the rate of 200 lbs. per acre.

Both Mr. A. Johnston and Mr. J. McDonald obtained the very creditable calculated yield of 36 bushels per acre, the former with the variety "Bena" and the latter with the variety "Nabawa."

As was the case during 1927 all the crops entered through the Gnowangerup Society were of a high standard. It is to be regretted that five out of the ten competitors are still pickling their seed by the formalin method instead of by the more up to date and convenient dry method with copper carbonate.



A. W. Parkinson's 50 acres "Yandilla King."
Winner—Championship Prize, No. 8 Zone;
Royal Agricultural Society's Special Prize.
Yield—40 bushels per acre.

N. L. P. Davis' 50 acres "Nabawa."
Yield—39 bushels per acre.

Farley Photos., Gnowangerup.

J. McDonald's 50 acres "Nabawa."
Yield—36 bushels per acre.
Farley Photos., Gnowangerup.

A. Johnston's 50 acres "Bena."
Yield—36 bushels per acre.
Photo. by R. Farley, Gnowangerup.

It was fortunate for this district that the rainfall conditions of 1928 which affected so many crops throughout the remainder of the wheat belt did not seriously depreciate the yields in this zone.

The rainfalls as officially recorded at Gnowangerup and Borden during the year were:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.					Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.			
Gnowangerup	207	...	5	244	101	145	258	219	199	60	982	13	13	1,464
Borden ...	195	...	...	104	82	100	212	158	208	50	810	..	...	...

The methods of cultivation and other details are summarised below:—

TABLE 37.

GNOWANGERUP DISTRICT CROP COMPETITION.

ZONE 8.

Competitor	Parkinson, A. W.	Davis, N.	Johnston, Alfred.	McDonald, John.	Milne, Malcolm.
Years cropped	Fifth crop	Fifth crop	Third crop	Old land	Old land, first crop for six years
Timber ...	York Gum, Jam, and Morrel, with scattered Manna Gum	Morrel and York Gum	York Gum, Manna Gum, Poot, Sheoak in one corner	York Gum with some Morrel and Manna Gum	Jam, York Gum and Morrel
Ploughed ...	June and July	July	August	Late July and early August	July
Type of plough	Mouldboard	Mouldboard	Mouldboard	Mouldboard	Disc
Depth ...	3½in. to 4in.	3½in. to 4in.	2½in. to 3in.	3in. to 3½in.	2½in. to 3½in.
Condition of land at time of ploughing	Fair	Good	Good	Fairly good	Hard
Other cultivations	Springtyne cultivated early August. Disced 2½in. deep in September. Portion skim ploughed with Mouldboard in October, whole Springtyne cultivated in October and again in Nov. Springtyne cultivated in March and again twice before drilling. Light drag harrows behind drill	Springtyne cultivated in September, in October, twice in January and once in April after rain in each case. Drilled with Combine with light drag harrows	Disced 2in. deep in Spring. Harrowed twice in Spring. Duckfoot cultivated and harrowed before seeding. Harrowed after drill	Springtyne cultivated and harrowed in Sept. Skim ploughed 2in. deep in January. Springtyne cultivated in April. Drilled with Combine with light drag harrows behind	Disced 2in. deep about late August and early July. Springtyne cultivated in October. Skim ploughed in April. Drilled with Combine
Variety ...	Yandilla King	Nabawa	Bena	Nabawa	Nabawa
Planted ...	2nd to 3rd week in May	First week in June	End of May	5th to 9th June	1st and Second week in June
Rate of seed	45lbs.	45lbs.	60lbs.	52lbs.	45lbs.
Graded ...	Yes	Yes	Yes	Yes	Yes
Treated ...	Pickled with formalin	Dry pickled	Pickled with formalin	Dry pickled	Dry pickled
Rate of super.	112lbs.	200lbs.	73lbs.	96lbs.	112lbs.
Disease ...	Trace of Flying Smut	...	Trace of Take all		

TABLE 37, ZONE 8—*continued.*

GNOWANGERUP DISTRICT CROP COMPETITION—*continued.*

Competitor	Ball, J. L.	Wyatt, C. A.	Murray, Gordon.	Wright, E. H.	White, A. J.
Years cropped	First crop	Third crop	Old land	Fourth crop	Second crop
Timber ...	Jam and Morrel	Poot and York Gum	York Gum and Poot	York, Gum, Poot and Manna Gum	Morrel and York Gum
Ploughed ...	Early August	July	July and August	August	August and September
Type of plough	Mouldboard	Mouldboard	Disc	Mouldboard	Mouldboard
Depth ...	3in.	4in.	2½in. to 3in.	3½in.	4in to 5in.
Condition of land at time of ploughing	Good	Good	Good and bad	Good	Fair
Other cultivations	Disced and harrowed in Spring. Drilled with Combine with light drag harrows	Twice harrowed and then shim-ploughed with Mouldboard in Spring. Skim ploughed twice in April. Harrowed after drilling	Re-disced 2in. deep in December. Springtyne cultivated in February and again in April. Drilled with Combine	Disced 2in. deep in October. Springtyne cultivated beginning of May and drilled with a Combine with light drag harrows	Springtyne cultivated in November. Drilled with Combine
Variety ...	Bena	Drof	Nabawa	Bena	Walker's
Planted	Middle of May	13th May	First week in June	21st May	First week in May
Rate of seed	47lbs.	45lbs.	52lbs.	60lbs.	50lbs.
Graded ...	No	Yes	Yes	Yes	Yes
Treated ...	Pickled with formalin	Pickled with formalin	Dry pickled	Pickled with formalin	Dry pickled
Rate of super.	85lbs.	85lbs.	96lbs.	85lbs.	80lbs.
Disease ...	...	Trace of Septoria	Trace of Flying Smut	Trace of Take-all	...

ROYAL AGRICULTURAL SOCIETY.

Five entries in Zone 8 were received direct through the Royal Agricultural Society. Of these three submitted their crops for inspection.

The points awarded for these crops are as hereunder:—

TABLE 38.

THE ROYAL AGRICULTURAL SOCIETY.

ZONE 8.

Judge: A. S. Wild, Agricultural Adviser.

Name.	District.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Stone, J. D. ...	Borden ...	Nabawa ...	31	18	14	14	8	85
Wilson, A. F....	Dumbleyung...	Yandilla King	32	18	14	13	8	85
Clifford, M. (Estate of)	Gillimanning...	Nabawa ...	24	18	14	14	9	79

The rainfalls as recorded at Borden, Dumbleyung and Wickepin (the nearest recording station to Gillimanning) were:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
Borden ...	195	...	...	104	82	100	212	158	208	50	810	...	...	
Dumbleyung	85	...	13	153	152	148	446	312	174	76	1,308	6	26	1,591
Wickepin	81	...	16	134	143	108	482	375	161	79	1,348	1	26	1,606

The details of the cropping are as hereunder:—

TABLE 39.

ROYAL CROP COMPETITION.

ZONE 8.

Competitor ...	Stone, J.	Wilson, A. F.	Clifford, M. (Estate of).
Years cropped	Old land	Old land	5 crops
Timber	Morrel and York Gum with some Jam	Jam, Salmon and York Gum	York, Jam and Manna Gum
Ploughed	Mid-August	...	July
Type of plough ...	Mouldboard	Mouldboard	Mouldboard
Depth	4in.	2in.	4½in.
Condition of land at time of ploughing	Good and bad	Good but dry	Good and bad
Other cultivations...	Springtyne cultivated three times in Spring and before seeding. Duckfoot cultivated before seeding	Harrowed after plough. Scarifed and then harrowed about October. Scarifed again and left till Autumn when Springtyne cultivated with harrows behind. Drilled with Combine and harrows	Springtyne cultivated in Spring, again in Autumn and again prior to seeding
Variety	Natawa	Yandilla King	Nabawa
Planted	End of May	End of May	Third week, May
Rate of seed ...	58lbs.	60lbs.	72lbs.
Graded	Yes	Yes	Yes
Treated	Yes; dry	Yes: dry	Yes: dry
Rate of super. ...	96lbs.	90lbs.	120lbs.
Disease	Trace of Flying Smut	Trace of Take-all and trace of Flying Smut	Trace of Take-all

ROYAL AGRICULTURAL SOCIETY ZONE CHAMPIONSHIP AWARDS.

The entrants for these championship prizes are the first and second prize winners of the district competitions, and also the competitors who enter direct with the Royal Agricultural Society.

The competitors in the different zones and the total points allotted are shown in the table hereunder:—

REPRESENTATIVES FROM DISTRICT AGRICULTURAL SOCIETYS' COMPETITION.

Competitor.	Society.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
ZONE 1—								
Forrester, J. K.	Royal ...	Nabawa ...	35	16	14	13	9	87
Hebiton, J. K.	Royal ...	Merredin ...	30	16	13	13	9	81
ZONE 2—								
Honner, R. J. & Sons	Dalwallinu ...	Gluyas Early	25	16	14	13	9	77
Porter, F. A.	Royal ...	Nabawa ...	21	16	14	12	9	72
Meadowcroft Bros	Geraldton ...	Toby's Tusk	20	16	14	12	9	71
Locke, F. C.	Dalwallinu ...	Ford ...	20	15	14	13	7	69
ZONE 3—								
Bryan, P. A.	Wongan Hills	Nabawa ...	29	18	14	13	8	82
Sawyer, T. G.	Goomalling ...	Nabawa ...	30	18	12	13	8	81
Slater, W. G.	Wongan Hills	Nabawa ...	27	18	13	13	9	80
Cosh, E. C. ...	Dowerin ...	Merredin ...	24	19	12	14	9	78
Hughes, J. R.	Dowerin ...	Nabawa ...	26	17	12	14	8	77
Whittingham, T. M.	Wyalkatchem	Merredin ...	22	18	14	14	9	77
McKay, N....	Wyalkatchem	Merredin ...	23	18	14	13	8	76
French, E. ...	Goomalling ...	Nabawa ...	20	17	14	13	8	72
ZONE 4—								
Young, G. T.	Nungarin ...	Gluyas Early	24	19	14	15	8	80
Creagh Bros.	Nungarin ...	Nabawa ...	22	18	14	14	9	77
Dunkley, G. A.	Mt. Marshall	Gluyas Early	22	19	13	14	9	77
Payne, H. ...	Nungarin ...	Merredin ...	22	19	14	12	8	75
Reynolds, A. G.	Royal ...	Gluyas Early	17	20	14	14	9	74
Richardson, J.	Royal ...	Nabawa ...	17	19	14	11	9	70
Hopwood, B. W. G.	Mt. Marshall	Gluyas Early	17	18	14	12	8	69
ZONE 5—								
Deane-Hammond, J.	Royal ...	Carrabin ...	26	19	14	14	8	81
Strange, P. A.	Bruce Rock	Gluclub ...	25	19	13	14	8	79
Smith, C. & Sons	Bruce Rock	Gluclub ...	25	18	13	14	8	78
Prowse, A. E. C.	Doodlakine-Baandee	Gluyas Early	24	18	12	14	9	77
Barton & Sons	Doodlakine-Baandee	Gluyas Late	25	17	13	13	8	76
Buller & Black	Bruce Rock	Nabawa ...	23	18	14	13	8	76
Mann, R. ...	Bruce Rock	Gluclub ...	23	18	14	13	8	76
Smallacombe, H. A.	Merredin ...	Canberra ...	22	17	14	14	7	74
Maughan Bros.	Merredin ...	Merredin ...	19	19	13	13	8	72
ZONE 6—								
Richards, T.	Royal ...	Nabawa ...	25	18	14	14	8	79
Smith, H. D.	Royal ...	Nabawa ...	24	17	14	14	8	77
ZONE 7—								
Stephens, F.	Lake Grace ...	Caliph ...	31	19	14	14	9	87
Freebairn, F. S.	Kulin ...	Queen Fan ...	26	19	14	14	8	81
Bishop, H. ...	Lake Grace ...	Nabawa ...	25	19	14	14	8	80
Trotter, A. W.	Kulin ...	Hard Federation	26	18	14	14	8	80
ZONE 8—								
Parkinson, A. W.	Gnowangerup	Yandilla King	40	18	14	13	9	94
Davis, N. ...	Gnowangerup	Nabawa ...	39	18	14	14	8	93
Stone, J. D....	Royal ...	Nabawa ...	31	18	14	14	8	85
Wilson, A. F.	Royal ...	Yandilla King	32	18	14	13	8	85
Estate M. Clifford	Royal ...	Nabawa ...	24	18	14	14	9	79

ZONE CHAMPIONSHIP AWARDS—*continued.*

ROYAL AGRICULTURAL SOCIETY—ZONE CHAMPIONSHIP AWARDS.

50 ACRE CROP COMPETITION, 1928.

Zone.	Competitor.	Address.	Society.	Variety.	Total points.	Place.
1	Forrester, J. K. ...	Carnamah ...	Royal	Nabawa ...	87	1st
	Hebiton, J. K. ...	Three Springs	Royal	Merredin ...	81	2nd
2	Honner, R. J. & Sons	Dalwallinu ...	Dalwallinu ...	Gluyas Early...	77	1st
	Porter, F. A. ...	North Ajana ...	Royal	Nabawa ...	72	2nd
3	Bryan, P. A. ...	Wongan Hills	Wongan Hills	Nabawa ...	82	1st
	Sawyer, T. G. ...	Goomalling ...	Goomalling ...	Nabawa ...	81	2nd
4	Young, G. J. ...	Talgomine ...	Nungarin ...	Gluyas Early	80	1st
	Creagh Bros. ...	Kwelkan ...	Nungarin ...	Nabawa ...	77	2nd
	Dunkley, G. A. ...	Yelbeni ...	Mt. Marshall ...	Gluyas Early	77	2nd
5	Deane-Hammond, J.	Kellerberrin ...	Royal	Carrabin ...	81	1st
	Strange, P. A. ...	Yarding ...	Bruce Rock ...	Gluclub ...	79	2nd
6	Richards, T. ...	South Caroling	Royal	Nabawa ...	79	1st
	Smith, H. D. ...	Beverley ...	Royal	Nabawa ...	77	2nd
7	Stephens, F. ...	Lake Grace ...	Lake Grace ...	Caliph ...	87	1st
	Freebairn, F. S. ...	Kulin	Kulin	Queen Fan ...	81	2nd
8	Parkinson, A. W....	Gnowangerup...	Gnowangerup...	Yandilla King	94	1st
	Davis, N.	Gnowangerup...	Gnowangerup...	Nabawa ...	93	2nd

LEADING COMPETITORS FOR ROYAL SOCIETY'S SPECIAL PRIZE FOR HIGHEST YIELD IN ANY ZONE.

Zone.	Competitor.	Address.	Variety.	Calculated Yield.
8	Parkinson, A. W.	Gnowangerup ...	Yandilla King ...	40
8	Davis, N.	Gnowangerup ...	Nabawa	39
8	Johnston, Alf.	Gnowangerup ...	Bena	36
8	McDonald, John	Gnowangerup ...	Nabawa	36
1	Forrester, J. K.	Carnamah	Nabawa	35
8	Wilson, A. F.	Dumbleyung ...	Yandilla King ...	32
8	Milne, M.	Borden	Nabawa	32
7	Stephens	Lake Grace ...	Caliph	31
8	Ball, J. L.	Gnowangerup ...	Bena	31
8	Stone, J. D.	Borden	Nabawa	31
1	Hebiton, J. K.	Three Springs ...	Merredin	30
3	Sawyer, T. G.	Goomalling ...	Nabawa	30
3	Bryan, P. A.	Wongan Hills ...	Nabawa	29
1	Hunt, E.	Three Springs ...	Carrabin	28
1	Cuming Bros.	Inering	Nabawa	28
8	Whyatt, C. A.	Pallinup	Drof	28
3	Slater, W. G.	Wongan Hills ...	Nabawa	27
3	Hughes, J. R.	Minnivale	Nabawa	26
3	Ackland, R. B.	Wongan Hills ...	Merredin	26
5	Deane-Hammond, J.	Kellerberrin ...	Carrabin	26
7	Freebairn, F. S.	Kulin	Queen Fan ...	26
7	Trotter, A. W.	Kulin	Hard Federation	26
8	Murray, G.	Borden	Nabawa	26
8	Wright, E. A.	Pallinup	Bena	26
2	R. J. Honner & Sons... ...	Dalwallinu ...	Gluyas Early ...	25
5	Strange, P. A.	Yarding	Gluclub	25
5	Smith, C. & Sons	Yarding	Gluclub	25
5	Barton & Sons	North Baandee ...	Gluyas Late ...	25
6	Richards, T.	South Caroling ...	Nabawa	25
7	Bishop, H.	Lake Grace ...	Nabawa	25
7	Woodburn, —	Lake Grace ...	Yandilla King ...	25
7	Lay, —	Lake Grace ...	Nabawa	25
7	Bowcy, J. P.	Kulin	Ford ...	25

OBJECTS OF THE COMPETITION.

The object of the competition is to raise the standard of wheat growing throughout the State, whereby the average wheat yields per acre will be increased. Gratification of this desire can only be accomplished in a society of enlightened and intelligent farmers—prepared to learn themselves and at the same time by their example, teach their neighbours. A district devoid of community spirit is lacking in enterprise. The community spirit is fostered by a competition such as this. Not only does the competitor—and his neighbour who does not compete—visualise other farmers in the district in a different light, but he becomes part and parcel of a competition extending over the whole of the wheat belt. His outlook is bounded not by the narrow limits of what is done in his own particular district, but by a knowledge of the fact that there are practical men either farming better than he or who may be doing so in the future. The results obtained by farming along definite, up-to-date methods advertise important and valuable knowledge from the more experienced to the less experienced settlers. The competition is concerned, not with finding the best farmer in the State, but with demonstrating in a practical way, that where recommended methods are employed, reasonable success follows.

Consequently, there is forged a closer link between the farmer and the Department of Agriculture.

The Season.

The season under review was one which caused anxiety and at times, alarm, regarding the prospects of the crops.

The summer and autumn months were unusually dry and consequently the fallow land received but little attention, as the rain which fell was insufficient to destroy the mulch or cause the weed seeds to germinate. May was also unusually dry and the month was well advanced before the seasonal rains began. Under such circumstances little or no opportunity was offered to prevent weed growth.

It was not until July that good soaking rains were experienced. During this and the following month normal conditions prevailed and at the end of that time the prospects were promising. Unfortunately, however, these conditions did not continue; no rain of any consequence was experienced in the Eastern districts after the first week in September. This period is the most critical in the growth of the wheat crop and, therefore, the anxiety which was felt was not unwarranted.

This being so, the lack of rain during the months of September and October provided a severe test of the efficiency of the methods practised.

The yields which were obtained show that the methods are sound and can be followed with confidence.

There is little doubt that in practically all districts the yields were reduced by the adverse weather conditions which prevailed. Fortunately, they were not reduced to the extent it was anticipated before the judging of the crops was commenced. A reason for this is immediately looked for and when analysed four factors present themselves as being most responsible, viz., Fallowing; the planting of suitable varieties; planting at the correct time, and the liberal application of superphosphate.

Entries.

The total number of competing crops inspected was 114 compared with 100 the previous year. This increase in a year of scanty rainfall indicates that the competition is not lacking in interest.

Entries were received from thirteen district Agricultural Societies, whilst twelve entries were received direct by the Royal Agricultural Society.

Fallowing.

All the competitors ploughed their land for their competition plot during the months of June, July, or August of the previous year. In this connection it has been demonstrated by experiments that a higher yield may be expected from the land when ploughed early in the fallowing season than when ploughed later. From an experiment conducted at the Merredin Experiment Farm, the average results show that an increase of four bushels four lbs. per acre was obtained from the plots fallowed in June as compared with the plots ploughed in August.

The average depth of the initial ploughing was from three to four inches, both disc and mouldboard ploughs being used for this operation. The advantage of using either type of implement is determined by the type and condition of soil to be ploughed. Whether the disc or the mouldboard plough be selected, it is essential that the work be done thoroughly.

It is particularly pleasing to note that many of the competitors are appreciative of the value of sheep to assist in controlling weed growth on the fallowed land.

Some of the reasons for fallowing are the conservation of moisture, the destruction of weed growth, the enrichment of the soil's supply of plant food, the control of disease, and the preparation of a suitable seed bed. Since the majority of the competitors are farming with these objects in view, it is not surprising to find a striking similarity between the methods adopted for the preparation of the seed bed. The springtyne cultivator was the implement chiefly used for the cultivation subsequent to the initial ploughing. A disc implement, however, was favoured for cultivations where the land was hard or weedy.

Varieties.

As was the case in 1927, the most popular variety was "Nabawa," 53 of the 114 competition crops being planted with this standard midseason maturing variety. The consistent yields obtained from this variety over a number of years, and its resistance to drought and disease have been sufficient to justify the confidence which the wheat farmers of the State have in this, a variety which has proved suitable for all districts.

Fifteen competitors submitted crops of the early variety, "Merredin." The growing popularity of "Merredin" is justified where an early variety is desired for planting late in districts of an assured rainfall. The standard early variety "Gluyas Early" was planted by thirteen competitors.

The variety "Gluclub" was planted by five competitors, all of whom were located in the Bruce Rock area.

Four competitors planted the standard late variety, "Yandilla King." It was a crop of this variety—so suitable for late districts—which, again, secured the Royal Agricultural Society's Prize for the highest yield in this Competition.

Three crops were planted with the variety "Ford" and the same number with the variety "Bena," while two of each were planted with "Canberra," "Hard Federation," "Queen Fan," "Caliph," "Gluyas Late" and "Carrabin."

The varieties "Toby's Tusk," "Gresley," "Wilfred," "Drof," "Walker's" and "Baroota Wonder Early" were each planted by one competitor.

Diseases.

Although reliable preventative methods are available for the prevention of Ball Smut, there are still some farmers who are not successful in entirely preventing this disease. The most popular method of treating the weed is the dry method with copper carbonate. When correctly applied, this method is effective in preventing the disease. It has the additional advantage that the seed can be treated immediately after harvest and when treated the copper carbonate acts as a preventative against vermin.

Although the majority of the competitors adopted the dry method, all of those who used it were not successful. The highly satisfactory results which many have obtained with this treatment indicate that failure with it is due to some defect in the methods of application. Effective results can only be obtained when the seed is dusted thoroughly with the powder. Those working the machines for treating the seed are sometimes inclined to treat the work as a "rush" job, and in consequence the grain is not covered as thoroughly as it should be.

The disease, "Flag Smut", was noticed in several of the crops. It is more difficult to control than "Ball Smut" or "Bunt," because the disease is transmitted through soil infection and distributed as a result of the spores on the foliage of the wheat plant being blown about. To control this disease it is advisable to plant a resistant variety such as "Nabawa." As an additional precaution, and particularly when resistant varieties are not available or are unsuitable for the special climatic conditions, the land for the next crop should be fallowed in the early winter months—June and July—and all weed growth which may appear on the fallowed land destroyed either by sheep or by cultivation. It is also advisable, where possible, to grow a crop of oats between the two crops of wheat.

Some crops were also attacked by the disease "Take-all." Unfortunately, no variety as yet is known to be resistant to this disease, and its control, therefore, depends entirely on the farming practice adopted. Suitable methods for the control of "Take-all" are similar to those already recommended for the control of Flag Smut. In addition, planting as late as is safe in the sowing period is beneficial. Early fallowing and late sowing should, therefore, be the methods adopted to control this disease.

The occurrence of Flying or Loose Smut of wheat is more difficult to prevent. Fortunately, it is unusual for crops to be seriously affected by this disease. The treatment of the seed for the control of Flying Smut of wheat cannot be economically undertaken. A reasonable control, however, is to be expected by planting clean seed from clean crops.

The disease Septoria is liable to occur in crops of early varieties of wheat planted too early. Under these conditions there is a tendency for the plants to make rank and flaggy growth, and as result they become more susceptible to infection by the fungus. The control of Septoria consists of seasonable planting and the practice of the clean farming methods recommended for the control of Flag Smut and Take-all. The inclusion of an oat crop in the rotation is also beneficial.

Time of Seeding.

The period during which the various crops were planted extended from the middle of April to the first week in June.

The following table shows the time at which the crops in the various Zones were sown:—

Zone.	Number of Competitors.	Number of Competitors Planting during:					Unknown.
		End of April.	First fortnight in May.	Middle of May.	Last fortnight in May.	Beginning of June.	
1	5	...	1	1	2	1	
2	7	1	4	1	1	...	
3	31	6	5	8	9	3	
4	10	1	1	2	6	...	
5	25	10	5	3	5	2	
6	2	...	...	...	2	...	
7	21	4	4	9	3	...	1
8	13	...	1	6	2	4	
Total	114	22	21	30	30	10	1

Eighty-one of the competitors planted during the months of May, 21 in April, and 10 in June. Where it is necessary, owing to the area to be sown, to seed outside the month of May, it is better to plant suitable varieties in April rather than extend the period of planting into June.

Rates of Seeding.

The quantities of seed sown varied from 38lbs. to 75lbs. per acre. The table hereunder shows the rates employed in the different zones:—

Zone.	Number of Competitors.	Number of Competitors using:				Unknown.
		Under 45lbs. per acre.	45lbs. per acre.	45lbs. to 60lbs. per acre.	Over 60lbs. per acre.	
1	5	...	...	5	...	..
2	7	...	...	7	...	..
3	31	2	6	19	4	..
4	10	3	5	2	...	..
5	25	1	10	14	...	..
6	2	...	2	...	...	..
7	21	2	5	13	...	1
8	13	...	4	8	1	..
Totals	114	8	32	68	5	1

The majority of the competitors planted from 45lbs. to 60 lbs. per acre. Experiments conducted at the experiment farms show that whilst the yield is not decreased by the heavier rate of seeding, no advantage is gained by increasing the amount over 45lbs. per acre. At the Yilgarn farm the results (which are for one year only) showed that the yields were not decreased when the low rate of 23lbs. of seed was sown.

Fertilisers.

Superphosphate was applied by all competitors, the rates of application varying. In one case as high as 200lbs. per acre was applied. The average amount used by competitors was 90lbs. per acre—an increase of 4lbs. per acre over the average for the previous year.

There is a general tendency to increase the rate of application of superphosphate for the wheat crop. This is noted in the table below which indicates the quantities and average amount used in each zone, the averages being compared with those of the previous year.

Zone.	Number of Competitors.	Number of Competitors using :—					Average rates in lbs. per acre, 1928.	Average rates in lbs. per acre, 1927.
		Under 80 lbs. per acre.	80 to 99 lbs. per acre.	100 to 119 lbs. per acre.	Over 120 lbs. per acre.	Unknown.		
1	5	...	1	4	...	...	108	123
2	7	1	5	1	...	...	86	69
3	31	2	9	12	8	...	102	90
4	10	1	6	3	...	...	91	81
5	25	1	18	4	2	...	91	86
6	2	1	...	...	1	...	100	101
7	21	5	9	3	3	1	92	85
8	13	1	9	1	2	...	102	87
Totals	114	12	57	28	16	1	90	86

The advantages of applying higher rates of superphosphate to the wheat crop is now becoming realised. This practice is encouraged because experiments carried out at the different experiment farms with different rates of applications, the results of which appear elsewhere in this publication, show that the yields of the wheat crop are increased when the heavier rates of superphosphate are applied.

Yields.

In the final remarks in the report on last year's crop competition, it was mentioned that the test of efficient farming comes when the season is least favourable.

The table below shows the comparison between the yields for the 1927-28 and the 1928-29 seasons. It is worthy of note that the rainfall registrations last season were, over the greater portion of our wheat belt, amongst the lowest on record.

Zones.	Number of Competitors.	Average calculated Yields.	Average calculated Yields, 1927.
1	5	29·0	28·0
2	7	19·3	22·4
3	31	21·3	25·6
4	10	18·3	29·2
5	25	20·4	26·2
6	2	21·5	29·0
7	21	23·0	25·6
8	13	31·1	32·0
Totals	114	22·5	26·9

The average calculated yield for all competing crops inspected this year was 22.5 bushels per acre, that for 1927 26.9 bushels, and for 1926 24.5 bushels per acre.

In view of the adverse growing season, these results are most gratifying and encouraging and are sufficient evidence to indicate that the methods which are advocated, and which are practised by the leading wheat farmers, can be continued and followed with confidence, and when generally adopted the average yield of the State will be increased.

SOIL ALKALI

(*Continued.*)

L. J. H. TEAKLE,
Plant Nutrition Officer.

III.—THE PROBLEM IN WESTERN AUSTRALIA.

In the earlier sections of this series an attempt was made to present the principles involved in the question of soil alkali or salt as a preliminary to the discussions of the problem as it confronts the farmer and orchardist in Western Australia. No attempt has been made in the past to define the problem in the Western Australian publications, but there is considerable literature as a result of investigations in various areas. In this paper full use is being made of the excellent discussion of the problem by Professor Paterson in his report to the Royal Commission on the Mallee Belt and Esperance Lands, Appendix 15, p. 165, 1917. The report deals with the nature and occurrence of alkali in soils of the district to the North of Esperance and affords data which will be supplemented by information collected by the writer.

Personal interviews with various people of experience in Western Australia have also contributed to this discussion in no small measure.

THE SOURCE OF ALKALI IN W.A.

The alkali is the result of—

1. Rock and soil weathering with the liberation of soluble materials,
2. Impregnation of the soil with soluble salts carried down in the rain,
3. Residues from the evaporation of inland seas.

In Western Australia these factors are all of importance in various areas. The factor of most general importance is that connected with rainfall.

Professor Paterson reports (*loc. cit.* p. 186) the analysis of rain water from a tank at Gibson's Soak Hotel, near Norseman. This water contained 95 parts of common salt per million (6.7 grains per gallon). Similar records have been obtained in South Australia and are reported by Mr. J. Lockhart Jack in Bull. 8 pp. 27-29, Geological Survey of South Australia, 1921. Rain water samples (from tanks) contained over 100 parts per million of dissolved salts (7.9 grains per gallon). Mr. Jack has calculated that from 100 to 300 pounds of salt per acre per annum is carried down with the rain in Yorke's Peninsula, South Australia.

Mr. W. E. Wood, Inspecting Engineer of the Railway Department discussed the problem in a paper to the Royal Society of Western Australia (Jour. Roy. Soc. Western Australia X pp. 35-47, 1923-4) and reported figures for the South-West portion of this State. Analysis showed that not infrequently rain falling on the Western slopes of the Darling Range carries with it 40 parts of salt per million (3 grains per gallon).

The salt content of the rain water is much higher following gales from the sea and during the early part of the precipitation. Mr. Blatchford, the Government Geologist, recently toured the Esperance district and in the course of his travels inspected a small waterhole at the top of a granite outcrop. The water was as salt as brine. This salt must have been deposited by the rain and accumulated as a result of evaporation of the water caught annually throughout many decades.

The rain collects the salt from the air as a very fine dust. This dust is derived from the evaporation of sea spray and from the surfaces of salt deposits. There is no data to prove the relative importance of each source, but it is safe to say that the importance will depend on the proximity of the sea or salt lake and the direction of the prevailing winds. When it is realised that this process continues for geological ages it is not difficult to comprehend the possibilities as a result of the movement of *cyclic salt*. The term "cyclic salt" is used by geologist to describe the soluble salts which are blown into the atmosphere in sea spray as a result of heavy gales. This salt remains suspended in the air as a very fine dust until it is washed to earth by rains. Following its deposit on the soil the "cyclic salt" makes its way to the sea by means of surface run-off and seepage into rivers and streams draining to the ocean or inland basins whence it came. In certain areas, this salt is trapped in the local drainage basins which, in many cases, are the remains of the river system of bygone ages. The climate has so changed that the river channels are now represented by the salt "lakes" so familiar in many parts of Western Australia. Depending on the contour of the country these lakes resemble narrow channels or expanded sheets. No doubt local cycles occur in these areas—the salt being blown into the air from the surface of the lakes, to be redeposited on the soil when the movement back to the lakes begins.

Geological evidence shows that the southern part of Western Australia was submerged in the Tertiary period—that is in comparatively recent times according to the geologists' calendar. With the elevation of the area inland lakes would be formed and, on evaporation of the water, the soluble material would remain. Perhaps some of the salt lakes of the Esperance-Norseman area originated in this manner.

DISTRIBUTION OF ALKALI IN THE SOIL.

Following the deposition of the alkali salts on the soil by whatever means, distribution is effected by means of moisture movements in the soil. With the percolation of water through the surface layers the soluble materials are carried downwards. Three types of distribution may be recognised.

1. Where the rainfall is sufficient to provide adequate drainage the soluble salts appear in the creeks and are carried to the sea or to inland drainage basins. Examples of this may be met with in the South-West of this State where the creeks entering the sea are often extremely salt. This salt was leached from the soil by percolating waters and will return to the sea whence it came, thus completing the cycle.

2. In the semi-arid or arid districts the alkali will be leached to a certain depth only and will accumulate in the subsoil. The Eastern wheat belt falls in the semi-arid zone, the rainfall being from 10 to 14 inches only. In the virgin state the rains saturate the soil in the surface layers only. In dry seasons as in 1928, the soil is never saturated below one foot to eighteen

inches deep. In wet years the depth of saturation will be considerably deeper. A measure of the average depth of saturation is given by the occurrence of an accumulation of alkali. Under normal conditions in the forest there is little or no movement to the surface by capillarity because the roots absorb the moisture too rapidly. Where root action is insufficient the intense drying action of grasses and winds in spring dessicates the surface, forming a natural mulch. Through this mulch the moisture escapes as a vapour, just at petrol escapes from a tin with a hole in the top. Now alkali does not move with vapour, but remains in the subsoil. Examples of analytical data to support these contentions are given below.

Professor Paterson (*loc. cit.* p. 174) gives in table 10 the results of analysis of 10 samples of soil from the Esperance area. The average concentration of sodium chloride (common salt) at the three depths sampled are as follows:—

Depth	0 to 6 in.	6 to 18 in.	18 to 36 in.
Sodium Chloride, per cent.	0.073	0.185	0.339

In the course of the investigations in the Lake Brown area by District Inspector Cook and the writer, similar results as hereunder were obtained from the examination of over 100 samples:—

Depth	0 to 12 in.	12 to 24 in.
Total Salts, per cent.	0.123	0.213

With the clearing of the timber the balance between the vegetation, the soil and the rainfall is upset. Supposing a heavy forest to absorb four inches of water over an acre per year in transpiration, it is obvious that this amount of water must find some other avenue of escape following the clearing of the land.

Some will evaporate; some will reach the lower levels by surface run-off; a considerable portion will percolate in the soil carrying with it the soluble salts present in the lower layers of soil. Springs or damp patches will form in the lower contours where this water comes to the surface. With the surface evaporation from the damp patches alkali will accumulate. This process has been going on for long periods in certain areas resulting in salt lakes, which in many cases are only old river channels—vestiges of a wetter climate. With the progress of clearing, other areas of low elevation will become part of the drainage system and the local areas will become affected by salt. Soils bearing Morrell (*E. longicornis*) and Yorrell (*E. gracilis*), particularly in the vicinity of salt lakes, are salt liable and it will often be noticed that there is a more or less permanent dampness associated with the salt patches. As these soils usually occupy the lower levels, and may even be silted up lake or pond basins, it is not at all surprising that this condition exists. Given an outlet to lower levels, for instance to a lake, it is quite possible for the silty soils bearing morrell to be quite free of excess alkali. In fact much of the country carrying morrell is quite valuable agriculturally and may be farmed successfully when due recognition of the physical nature of the soil is made.

3. The third type is intermediate between the first and second types and is represented by the Great Southern districts, the Geraldton district and others. The rainfall is generous and there is an abundance of creeks which flow in the rainy season. Following clearing of the timber the flow of the creeks increases, new creeks arise, springs or seepage zones appear and, with the evaporation of these springs or seepage zones, salt patches form. The analyses of water from two springs from Mr. J. Edward's farm at East

Pingelly will illustrate the principle. These springs occur on a cleared slope and are about two chains apart. The lower one is now quite salt, while the upper one is quite fresh. The area between the two springs has become affected with alkali due, no doubt, to the evaporation of water leaving behind the soluble salts. In the course of years the accumulation results in the land becoming sterile unless drainage and the removal of these salts is effected.

The analyses are as follows:—

	Total Salts. Parts per million	Sodium Chloride. P.P.M.	Grain/gallon
Fresh Spring (top of salt area)	294 ..	148 ..	10.5
Salt Spring (lower part of salt area)	8,056 ..	7,452 ..	530

Examples of a similar nature may be seen in the Darling Ranges, along the Northam to Perth road and almost anywhere that the timber has been cleared in this zone.

The writer is particularly familiar with parts of the Northampton district where, as a result of clearing and ring-barking, springs appeared and areas became affected with alkali. During the early stages of the devel-

Plate 2.

Alkali patches appearing in depressions following the clearing of timber at Isseka.

(Photo by L. J. H. Teakle.)

opment of this district the alkali increased at an alarming rate, but the tide turned and now the affected areas have stopped increasing or have decidedly improved. Plate 2 illustrates the occurrence of alkali in a recently cleared

field at Isseka, Northampton. It is to be noticed that it is the lower levels, that is, the small valley, that has become affected. It may be predicted that with the continual leaching of the winter rains this area will improve as the soluble materials are washed down the creeks.

TYPES OF COUNTRY AFFECTED WITH ALKALI.

In his report to the Royal Commission (*loc. cit.* p. VI.) Mr. Surveyor Middleton estimated that of the 1,540,000 acres surveyed in the mallee belt and Esperance lands, larger salt lakes comprised 35,000 acres while the smaller salt lakes accounted for about 48,500 acres, a total of 5.5 per cent. of the total area. It is highly probable that a similar area is occupied by depressions which will become saline following clearing. Plate 3 illustrates

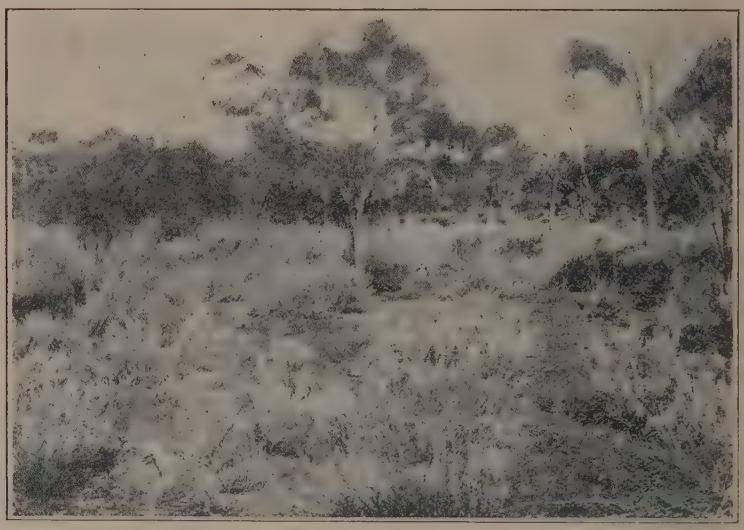


Plate 3.

At 120-mile post near Norseman, showing saltbush, etc. This represents an incipient salt lake. (Photo. from Report by Professor Paterson to the Royal Commission on the Mallee Belt and Esperance Lands, 1917, p. 189.)

an area carrying salt bush near Norseman. As far as cropping is concerned, this area may be regarded as an incipient salt lake, as the soil is already quite saline, the analyses being as follows:—

Depth.	Sodium chloride per cent.	Total salts, per cent.
0 to 12 in.	0.413	0.625
12 to 24 in.	0.318	0.592
24 to 36 in.	0.438	0.624

(Professor Paterson's report *loc. cit.* pp. 178-9 and Plate 6.).

Plate 4 illustrates similar country in the vicinity of Lake Brown. The prevailing timber is morrell with abundant salt bush. Examination showed this section to be inclined to alkali. Another area in the Lake Brown district carrying saltbush on ringbarked and cleared morrell country was examined more carefully later with the following results:—

	Total salts, per cent.
First foot (11 samples)	0.24
Second foot (10 samples)	0.52
Third foot (2 samples)	0.45

Plate 4.

Typical country liable to alkali in the Lake Brown area. The timber is a Morrell with saltbush undergrowth.

(Photo by L. J. H. Teakle.)

Although the surface foot of soil contains only 0.24 per cent. of total salts, which is at the upper limit for cropping, the subsoil is highly impregnated with alkali and the area represented by these samples must be considered unsafe for cultivation. While country carrying salt bush must be regarded as suspicious with respect to salt, the presence of salt bush is not an infallible guide as many determinations showed that samples from these areas were not affected with alkali. On the average, however, it would probably pay to fence the salt bush country and preserve it for pasturage. It is suggested that the information in the appendix prepared by Mr. C. A. Gardner be used as a guide to areas likely to be affected with alkali and that such country be not cleared for cultivation without a thorough inspection.

In the more Western sections of Western Australia, where the rainfall is higher, patches in any class of country may become affected with alkali

if subjected to an excess of water which is allowed to evaporate. Small patches of saline soil may be found in the valleys of the Darling Ranges; in the granitic country bearing Jam (*Acacia acuminata*), York Gum, (*Eucalyptus foecunda*) and associated timbers: and in other sections where the movement of moisture is conductive to surface evaporation throughout a considerable period of the year.

THE CHEMICAL NATURE OF THE ALKALI.

In the previous article tables were presented showing the composition of soil alkali in various parts of the world. According to the conditions, carbonates, sulphates, chloride or even nitrates may predominate. Magnesium salts cause trouble in rather rare cases.

In Western Australia Sodium chloride or common salt is the prevailing alkali salt. This fact is illustrated by the analyses reported in Tables 7 and 8.

TABLE 7.

Analysis of water soluble salts extracted from three composite soil samples from Lake Brown area (Analyses by Government Analyst using 1–2 water extract).

Constituents (Ions).	Parts per million of soil.		
	Soils 2 and 3.	Soils 4 and 8.	Soil 10.
Carbonate (CO_3)	84	108	126
Sulphate (SO_4)	426	158	112
Nitrate (NO_3)	602	205	43
Chloride (Cl)	1,698	889	387
Calcium (Ca)	161	113	30
Magnesium (Mg)	96	34	14
Potassium (K)	44	57	Trace
Sodium (Na)	1,199	583	356
Equivalent Sodium Chloride	2,800	1,470	638
Total Salts	4,310	2,147	1,068
Sodium Chloride per cent. of total Salts	65%	68·5%	59·8%

TABLE 8.

Analyses of water soluble salts extracted from soils from the Esperance lands and elsewhere as reported by Professor Paterson in his report to the Royal Commission (loc. cit., p 181). Analyses of sample from second foot only.

(Calculated from analyses made in 1917 by Mr. E. S. Simpson, Government Mineralogist and Chemist.)

Constituents (Ions).	Parts per million of Soil.							
	Soil 3B	Soil 5B	Soil 7B	Soil 8B	Soil 10B	Soil 12B	Soil 13B	Soil 14B
Carbonate (CO_3) ...	398	66	247	238	225	260	*Nil*	223
Sulphate (SO_4)	340	228	*Nil*	484	572	367	223	215
Nitrate (NO_3)	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*
Chloride (Cl)	647	67	80	2,905	2,909	2,028	2,222	1,126
Calcium (Ca)	30·7	30·7	22·1	37·9	*Nil*	30·7	6·4	12·9
Magnesium (Mg) ...	40·8	18·6	33·6	58·2	61·2	68·4	28·8	24·0
Potassium (K)	77	23·2	16·6	50	56·5	47·3	40·7	23·2
Sodium (Na)	735	118	142	2,115	2,185	1,505	1,460	930
Total Salts	2,267	552	541	5,884	6,008	4,298	3,983	2,556
Equivalent Sodium Chloride	1,071	111	132	4,789	4,796	3,343	3,663	1,857
Sodium Chloride per cent of total Salts	47·3%	20·5%	24·4%	81·5%	79·8%	77·9%	92·0%	72·8%

Of the soils containing over 0.2 per cent. of total soluble salts (the only soils which should be regarded as alkali soils) in only one (3 B) does sodium chloride or common salt constitute less than fifty per cent. of the total soluble matter. The average of the eight alkali soils reported in Tables 7 and 8,

which represent samples from Kellerberrin (13 B), Lake Brown and various parts of the Esperance area, shows that sodium chloride constitutes 73.1 per cent. of the total soluble salts of these soils.

It is interesting to note that sodium chloride constitutes about 77.75 per cent. of the dissolved salts in sea water. This fact supports in some measure the theory of "cyclic salt," as contributing to the salinity of soils.

None of the soils examined exhibit any considerable portion of sulphate or carbonate. Again, there is no evidence of "magnesia" being in sufficient quantity to be deleterious. Even gypsum or calcium sulphate is not present in any great amount in the majority of soils examined. Of course banks of gypsum occur in association with the salt lakes, but these are of no great extent as far as agricultural soils are concerned.

It may be concluded that in the majority of alkali soils of Western Australia, sodium chloride is the chief soluble constituent and is the harmful element.

THE EXTENT OF ALKALI AFFECTED AREAS.

There is no accurate estimate of the area of agricultural land which is affected by alkali. Surveyor Middleton estimated that about 5.5 per cent. of the Esperance Lands was actual salt lake so that it may be safely assumed that 10 per cent. of that area may be not worth clearing. In most other sections of Western Australia, the area which agriculturally is useless on account of rough hills, stony outcrops, creeks and other impediments, far exceeds the area which has actually "gone salt" following clearing. Few farmers can say that any considerable percentage of their farms has become affected with alkali. In the Lake Brown district, certain local areas are definitely affected by alkali, but these areas either carry salt bush in association with Yorrell (*E. gracilis*) and Morrell (*E. longicornis*) or occupy low lying parts to which even surface water drains in wet season. It is doubtful if over five per cent. of the arable land in this area is likely to be salt-affected. In most other areas the amount of salt-affected land will be considerably less.

As a result of enquiries by a Committee of the Royal Society of Western Australia, figures concerning the area of lands affected with alkali were obtained from Wagin and other centres on or near the great Southern Railway; from the Eastern wheat belt, including Lake Brown, Nungarin, Koorda and Wubin; and from Rockwell near Yuna, in the Northern part of the Wheat Belt. Calculations from the estimates given by farmers concerned, led to the results expressed in Table 9.

TABLE 9.

Area of land affected by alkali following the clearing of the timber on certain farms in the wheat belt of Western Australia.

Locality.	Total Area.	Area affected with alkali.	Per cent.
	acres.	acres.	
Wagin (6 farms)	9,252	291	3·1
Other G.S.R. Centres (12 farms)	25,692	289	1·1
Total for G.S.R. Centres (18 farms)	34,944	580	1·7
Other Centres (11 farms)	25,753	1,320	5·1
Total for State (29 farms)	60,697	1,900	3·1

(The writer is indebted to Mr. W. E. Wood, who kindly supplied the figures upon which these calculations were made.)

The highest figure reported was from Nungarin, where 27.5 per cent. of a thousand acre farm was affected with alkali. It is interesting to note that this farm is intersected by a chain of salt lakes and probably should never have been offered for selection.

RECLAMATION OF ALKALI SOILS.

The principles involved in the reclamation of alkali soils have already been discussed in an earlier part of this article. Most types of reclamation practice are suitable only for very valuable land and even then authorities often advise an expensive reclamation programme to bring back to fertility small patches which have arisen as a result of faulty irrigation practice. In Western Australia where land is relatively cheap, it will not pay to spend £15 or £20 per acre on reclamation, and measures must be adopted to suit local conditions.

In the Darling Ranges certain examples have come under the notice of the writer where a "salt patch" has been forming in a small valley, say, at the junction of two creeks. For a very small expenditure it should be

Plate 5.

A useful type of ditching machine recommended by the Irrigation Officer.

(Reproduced from "Surface Drainage with the Martin Ditcher," Fig. 2, by A. R. C. Clifton, Leaflet 140, Department of Agriculture, West Australia, June, 1924.

possible to adequately drain these patches before the soil becomes badly affected. Open drains cut about 2 or 3 feet deep by means of a plough and small ditcher (Plate 5) should be effective in the early stages. It would be necessary to drag a heavy log or ditcher down these drains occasionally to keep them clean until it was practicable to put in tiles. Fertile patches, perhaps an acre or so in extent, might thus be saved for summer fodder such as sorghum, maize or Sudan Grass.

In the Northampton district the writer has seen irregular gutters develop in the fertile depressions making it necessary to abandon small strips in certain paddocks. While it would not pay to cut drains in these paddocks at

the present value of land, the appearance of the paddock would be improved by systematic draining of these small areas and cultivation would be simplified.

Reclamation of some patches affected with alkali along a water course through his property at "Daliak," York, has been effected by Mr. A. J. Monger. The result was achieved by the application of a heavy dressing of stable manure and, later, sheep manure, and then planting subterranean clover with an application of superphosphate at the rate of 1 cwt. per acre. (Geo. L. Sutton, "The Reclamation of Salt Land at 'Daliak'" Journal of the Department of Agriculture of Western Australia, Vol. 4 pp. 199 to 201, 1927.) Whether this treatment will effect permanent improvement the test of time will tell. Excellent growth of pasture was obtained in the years immediately following the treatment.

The Eastern Wheat belt presents another problem as the distribution of alkali salts in the soil is more general owing to climatic factors. These soluble materials are very slowly moving to the salt lakes and local drainage basins, and the problem seems to be a recognition of those areas which are now drainage basins or will later become affected as a result of the increased moisture movement following clearing. Mr. C. A. Gardner, in the appendix, has dealt with the vegetation which very generally signifies the presence of alkali and this guide is to be recommended. Areas suspected of being liable to alkali should be used for pasture purposes. Ring-barking would encourage the growth of more edible herbage.

While many farmers are growing successful crops right up to the edge of salt lakes, there is evidence of a sufficient number of cases of failure to suggest the need for extreme caution in the bringing into cultivation of lands bordering the lakes. If the slope of the land and the drainage conditions are favourable, a rise of alkali to any large extent need not be feared, even adjacent to salty depressions, but care must be taken to ascertain these facts before investing much capital in the clearing of these lands.

Plate 6 illustrates a typical salt lake.

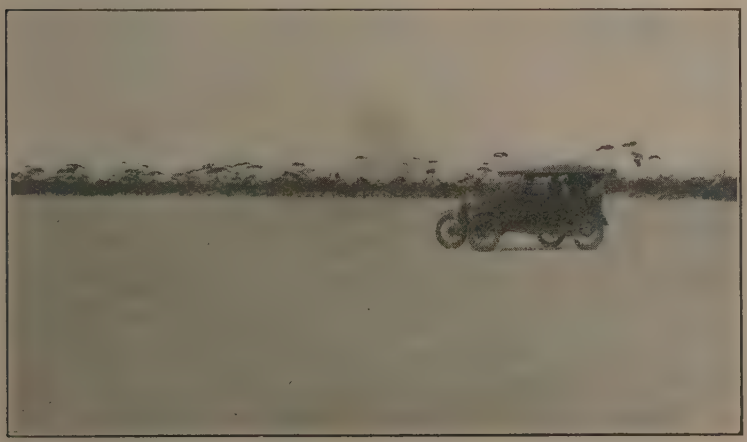


Plate 6.

A typical Salt Lake in the Lake Brown area.

(Photo. by L. H. J. Teakle.)

It has been said that clearing of land along creeks frequently leads to a rise of salt. As a matter of fact trees along creeks have often been killed owing to the rise of salt. This rise is due to the clearing of the large catchment areas on the *higher* slopes. In the absence of the timber on the rises more water percolates towards the creeks carrying with it soluble salts leached from the soil. In the lower levels the water table rises and salt is brought to the surface or feeds the creeks which become more saline.

CROPS FOR ALKALI SOILS.

Mr. Gardner is dealing with this problem in the appendix. Suffice to say that Atriplex species may be useful in the Eastern Wheat Belt to provide a permanent pasture as a standby. In the areas receiving more liberal rainfall, couch grass, sorghum, maize, sudan grass, etc., may prove useful summer crops as the areas liable to alkali are kept moist by underground seepage for at least a considerable portion of the summer.

Contrary to the popular belief, certain determinations made in the Lake Brown area indicate that Barley Grass (*Hordeum murinum*) is not very resistant to alkali. Patches in a wheat crop growing barley grass in profusion and no wheat contained from 0.023 to 0.20 per cent. alkali, averaging 0.058 per cent. alkali in the first foot. In one section near Lake Brown samples were taken from a patch of barley grass, an adjacent bare patch and from the wheat adjoining the bare patch. The results are expressed in Table 10.

TABLE 10.

The Tolerance of Barley Grass (*Hordeum murinum*) for alkali.

Soil sample.	Alkali per cent. in Soil.		
	Barley grass patch.	Bare patch.	Wheat crop.
	%	%	%
1st foot	0·20	1·10	0·23
2nd foot	...	0·86	0·42
3rd foot	...	0·70	...

The presence of Barley Grass with the failure of wheat does not necessarily imply the presence of alkali.

SUMMARY.

1. In a series of three papers the question of soil alkali is discussed.
   (a) As to its nature and occurrence,
   (b) As to the tolerance of plants for alkali in soil.
   (c) With regard to the problem in Western Australia.

2. Alkali is defined as those soluble materials which exist in the soil in excessive amounts. White alkali and black alkali are defined.

3. Alkali originates from various sources, the most important of which are—

(a) Soil decomposition in the process of weathering,

(b) Residues from the evaporation of bodies of water.

(c) "Cyclic" salt carried by the wind, especially from the ocean, and applied to the soil in rain water.

4. Plants differ in their tolerance for alkali. Tables are presented summarising work in America on this question.

5. In the State of Western Australia alkali manifests itself—

(a) In the salinity of streams in the wetter portions of the State,

(b) As patches, usually small, in valleys, creeks or below springs, in areas represented by Northam, Pingelly, and Northampton. The accumulation is often the result of increased moisture movement following the clearing of timber,

(c) As an accumulation, usually in mild amounts, in the subsoil of the Eastern wheat belt. This condition becomes acute in certain low lying areas, particularly in soils bearing salt bush with Morrell and Yorrell.

6. The commonest constituent of the alkali of West Australia is sodium chloride which amounts to about 75 per cent. of the total soluble salts. Danger from "magnesia" *may* occur, but in very rare cases.

7. It is estimated that less than 5 per cent. of the arable land of the State is affected with alkali.

8. By way of reclamation certain suggestions are made:—

(a) Provisions of a simple drainage system in the small patches in the wetter areas and the growth of summer crops on these areas.

(b) Use of land suspected of bearing alkali in the Eastern Wheat belt for pasturage purposes.

9. An appendix has been prepared by Mr. C. A. Gardner, the Government Botanist, dealing with the vegetation of soils liable to alkali and suitable plants to be grown on these areas if reclamation is contemplated.

The writer begs to acknowledge indebtedness to Mr. G. L. Sutton and Mr. C. A. Gardiner, who kindly read the paper and made useful suggestions, and particularly to Mr. C. A. Gardiner who prepared the Appendix.

APPENDIX.

By C. A. GARDNER.

Plants of saline soils are termed Halophytes or Salt plants. They frequently form definite associations wherever the soil is too saline to support the prevailing vegetation of the vicinity. Before halophytic vegetation can be brought into existence a certain amount of soluble salts must be present in the soil, and according to the degree of its concentration the characteristic vegetation differs. Plants growing in highly saline soils have one common feature which they share with plants of arid regions—they are xerophytes, or dry country plants. All possess special adaptations which reduce transpiration and consequent loss of water, for salt soils, even when moist, are dry as regards the plants moisture requirements, it being difficult to absorb water from a relatively concentrated salt solution. Hence to plants all salt soils are relatively dry, and irrespective of climate or elevation, there is a marked similarity between halophytic formations over the globe. In general, plants of salt soils are characterised by succulent stems or leaves, hairiness, scurfy leaves, thick and leathery leaves, or the plants may be leafless or spiny.

The drier portions of Western Australia are in many places characterised by salt pans, the so-called "Salt Lakes"—depressions which receive the surface water after heavy rains, and having no outlet the accumulated water evaporates, leaving deposits of salts. Some of these "lakes" are of considerable extent, many are linked together by channels which flow in exceptionally wet periods and are known as "salt rivers." Others again have an outlet to the sea, but the course is so long, and the periods when they flow throughout their length so very infrequent, that they usually function as lakes. These "lakes" even in the most arid country frequently have a treacherous mud in their beds, which is covered with the glistening ice-like deposits of salt which under the hot rays of the sun give most wonderful mirage pictures. To the south of the Mulga country, that is, generally south of the thirtieth parallel of latitude, the lakes are framed in Eucalyptus woodlands, but in the Mulga country to the north there is little beyond the encircling Swamp Oaks or Tea-trees to indicate their shores.

In the drier parts of the Wheat Belt it is usual to find trees of the Blackbutt and Morrel types fringing the salt pans in the loamy soil. The following are typical trees of their districts:—

Kondinin to Lake Grace and Newdegate: The Kondinin Stocking Tree or Lake Grace Blackbutt (*Eucalyptus Kondininensis*).

Salt River (Lake Brown, Hine's Hill, Wyola, Lake Meares, etc.): Salt River Gimlet (*Eucalyptus Sargenti*).

Eastwards from Merredin to the Goldfields: A Morrel (*E. oleosa*). Yorrell (*E. gracilis*).

The undergrowth is scanty, and consists very largely of Salt Bushes (*Atriplex mummularium, A. Drummondii, A. hymenotheca*), Rhagodia, and occasional plants of Blue Bush (Kochia) and Bassia. Occasionally thickets of Boree indicate the presence of salt. The herbaceous plants in these loamy soils are mostly Mesembryanthemum (a pig-face), Parakeelia (*Calandrinia spp*) and a few grasses, notably the spider grass (*Stipa elegantissima*) and Eragrostis.

Where the soil is of a lighter character the place of Eucalyptus is taken by the Swamp Oak (*Casuarina glauca*)—a species apparently restricted to saline soils throughout Australia. With it are grouped the Black Pine (*Callitris glauca*), and a few species of Tea-tree, notably the Tamarix-like Melaleuca thyoides. The actual "shore-line" of the salt pan in sandy soil is richer in succulents and small shrubs than the loamy soil. These are principally Samphires (*Arthrocnemum spp.*), small pink-flowered, small-leaved shrubs (Frankenia), Mesembryanthemum, "Pigface" and minor plants. The Samphires occupy the innermost fringe in the salt mud, they are banked in turn by Frankenia and the Tea-trees, and lastly by the Swamp Oaks. This picture might apply to the sandy shores of any salt pan in the dry areas. It is noteworthy that the sandy saline soil possesses a greater number of character plants than does the loamy soil where one frequently has nothing but the Eucalypts and Salt Bushes to denote the presence of salts.

In the South-West proper, true salt lakes are found. They are depressions in which the water is usually permanent and varies from brackish to excessively saline. The country in which these lakes occur is usually of a sandy nature. Tea trees take a prominent place in the bank vegetation, and to a less extent Swamp Oak and Flooded Gum. The Flooded Gum (*Eucalyptus rudis*) is however indicative of moist soils rather than salinity, and in this respect resembles the Flat-Topped Yate (*E. occidentalis*) which is found in clay depressions subject to inundation whether the water be fresh or salt. York Gum (*E. foecunda*, var. *loxophleba*) is also only occasionally of use as an indicator plant. It tolerates a certain soil salinity, but flourishes most in well drained granitic soils. Taken in conjunction with salt indicating shrubs it can, however, be useful as a guide, especially in the Morawa and Mullewa country. Unlike the conditions which prevail in the drier areas, the loamy or clay depressions in the South-West carry fresh water.

It is impossible in this appendix to enumerate, much less attempt to describe the plants which serve as indicators of salt soils, but the following descriptions may be found of some service.

The Kondinin-Lake-Grace Blackbutt (*Eucalyptus Kondininensis*). This tree is a typical Blackbutt, 40 to 60 feet in height. The trunk attains a height of 30 feet. The bark for a height of 3 to 7 feet above the ground is black, thick and flaky, and persistent. This rough bark ends abruptly (hence the fanciful allusion to a stocking), above the bark is smooth, shining and yellowish in colour, but blotched with patches of violet-grey bark. The timber is light to dark brown, dense, heavy and strong. The leaves are formed on a shallow crown like that of the Salmon Gum, and are dark green. This tree inhabits heavy loamy soil near Kondinin in the vicinity of Salt Lakes, and in forest soil where the undergrowth suggests salt. At Lake Grace and Newdegate it is a feature of the banks of the lakes.

A Red Morrel (*Eucalyptus oleosa*). This is one of the Red Morrels, and is a common tree of loamy soil inclining to salt from the vicinity of Lake Brown eastwards to Lake Lefroy. To all appearances it is a true Morrel scarcely to be distinguished from the common Red Morrel (*E. longicornis*) except by the short and blunt bud-cap (operculum) which in *E. longicornis* is long and tapering.

Salt River Gimlet or Bastard York Gum. (*Eucalyptus Sargenti*). This tree extends from Lake Brown country westwards to near Quairading. It occurs on the scrubby tea-tree "islands" of the Salt River which emerges from

Lake Brown, and is abundant at Hine's Hill. It is also a feature of the Mortlock River flats at Wyola. The tree is fairly common in the salt soils of the Central Avon district, and is always associated with the Salt tea trees.

Yorrell (*Eucalyptus gracilis*). This tree is not absolutely indicative of salt soils, although it is a common tree of salt loamy flats. Here, owing to the exclusion of its common associate, the Salmon Gum, it develops into a much better tree than when associated with the latter, having a short stout trunk and widely spreading branches. It is found in this condition in the Eastern Wheat Belt and the Eastern Goldfields. Closely resembling the Morrels it is frequently mistaken for them, but can be distinguished from them by its habit of growth, and small dark shining leaves in a wide umbrageous crown, also by its narrow spindle-like fruits which are not unlike those of the York Gum, a tree which it somewhat resembles, but having very different leaves.

Swamp Oak (*Casuarina glauca*). This is a Sheoak which inhabits saline soils. It has drooping branches, and a foliage which is as much grey as green.

Boree (*Melaleuca spp.*). These trees, which are tea-trees with a straight trunk and rough dark grey bark, usually occur in thickets. Although not a feature of many salt pans, they occupy depressions which tend to become markedly saline. Their distribution is principally southwards from Lake Brown to Lake Grace and Newdegate, and they are very abundant near Karlgarin.

Salt Bushes (*Atriplex spp.*) These shrubs are conspicuous from a distance by reason of their grey-white foliage. The Old Man Saltbush (*Atriplex mummularium*) is the largest and one of the most common. The term Salt Bush, however, has been loosely applied to several shrubs of this type which are not necessarily plants of salt soils.

When the soil is known to be salt, cultivation should be avoided. In the wheat areas the establishment of crop plants on these soils is impossible. The native vegetation is the only one which can survive. It is therefore, necessary to leave salt areas in a virgin state. The native plants have a certain fodder value, especially the salt bushes and the Parakeelias. The trees are useful for shade purposes, but when salt bush occurs it is advisable to ring-bark the trees to allow of better development of the salt bush.

Where salt areas have been cleared, cultivated and found unsuitable for crops, they should be allowed to revert to a native state. Salt Bushes may be planted, and it is advisable to commence planting from the outer edges of the affected soils.

In the wetter districts near the coast it is possible to grow certain crop plants. Sorghum, Maize and particularly Beets are found to succeed in soils which contain a certain amount of alkali.

"PERTINENT TOPICS."

G. L. Sutton,
Director of Agriculture.

THE BLACKBERRY PEST.

Because of the presence of the Blackberry bushes at Bridgetown, Collie and elsewhere in this State, and the reports as to its rapid spread and extreme difficulty of control in New Zealand, considerable concern is felt by some in this State as to the danger which the plant is to the agriculturists of Western Australia. It is therefore opportune to examine the position.

In the first place it is important to realise that this plant does not occupy a useful or economic place in our agricultural life, on the other hand it takes control of land which could be utilised profitably for other purposes. It is an extremely hardy perennial plant which thrives without attention, does not die out, but tends to spread so that the economic loss due to its presence tends to increase rather than decrease, it is therefore *obviously advisable to prevent it becoming established on new areas and to eradicate it where it is already established.* Though this is emphatically so it is not as serious a pest, nor such a danger, as in New Zealand. On this point Mr. W. M. Carne, when Botanist and Plant Pathologist to this Department, reported:—

> Owing to our dry summer Blackberry does not spread here as it does in New South Wales and Victoria, and much less than in New Zealand. To conclude that because it is a bad weed in America, Victoria and New Zealand it will be bad in this State, is unjustified and unscientific. The more humid the summer climate the more likely the plant is to be a pest.

The Blackberry plant has been declared a noxious weed throughout Western Australia, and "The Noxious Weeds Act, 1924," provides that the local authority—Municipal Council or Roads Board—has authority to, and shall deal with this pest. Under this Act Section No. 7 provides that any local authority may give notice in writing to the owner or occupier of any land within its district to destroy any noxious weed growing or being upon such land.

There is thus ample power to eradicate this weed by any local authority who desires to do so, and the Department of Agriculture is desirous of co-operating with and supporting those who wish to take action in this connection.

The departmental experience definitely shows that this pest can be eradicated, particularly on land intended to be cultivated. There is no case known where the plant has not been completely destroyed on land required for, and placed in cultivation. To eradicate the plant, continuous and thorough treatment for more than one year, and probably for three years, is necessary. No method, including spraying with plant poisons has yet been found whereby the initial destruction of the plants above ground will also destroy all the roots; in consequence there is a re-growth, and this, unless checked, will shortly exceed the original as if the bushes has been pruned.

The method recommended for the destruction of this pest is to destroy the original bushes by cutting, slashing or spraying, and then burning them, and to follow this up by killing the re-growth shortly after it appears, so as to reduce the reserve food supply in the roots and eventually kill them. If the bushes are destroyed so that the regrowth takes place during the summer, when green feed is scarce, stock given access to it will eat the young shoots, and thus will greatly assist in the destruction of the plant. The young growth can also be destroyed by manual or horse hoeing or cultivation, and probably by burning with an oil flame thrower. Trials with this latter method are now being made at Bridgetown by Mr. T. Flintoff, Orchard Inspector. Spraying with arsenate of soda has proved effective in destroying the bushes so that they can be burnt, and it has also to a limited extent destroyed some of the roots. This spray has the disadvantage that it is poisonous, and therefore dangerous to stock when they have access to it. With the object of discovering a non-poisonous spray for the same purpose, trials are to be made at Bridgetown with calcium chlorate. Research is being undertaken elsewhere to ascertain if the Blackberry can be controlled or eradicated by biological methods, but so far no insect or disease has been found which can be liberated with safety to achieve the desired object.

The Blackberry problem in Western Australia to-day is not whether the Blackberry pest can be eradicated, but what is the cheapest method of doing so. This is the problem which is of particular interest to the Bridgetown and Collie local authorities, who have, and are making earnest efforts to eradicate the pest on the public domain within their territory.

THE "BLUE" LUPIN.

Fodder Plant and Soil Renovator.

The place which the "Blue" Lupin has made for itself in Western Australian agriculture is remarkable and probably unique. Less than 25 years ago it was an undesirable alien and regarded as a noxious weed. Under the genial Western Australian sunshine a wonderful transformation has taken place. It is now one of our most desirable and valuable introductions, with a reputation of the very best kind, and so highly is it regarded as a stock food and as a soil renovator for our lighter and less fertile lands, that instead of endeavouring to eradicate it as a noxious weed, every effort is made to encourage its more general cultivation.

So valuable is the plant now regarded that with the object of providing a stimulus for its more general and extended cultivation, West Australian Newspapers, Ltd., have generously donated prizes amounting to £1,500—the first prize £1,000—for the best 100 acres of lupins on land not previously cropped with them.

It is not surprising that in the early days of its introduction it was regarded as a noxious weed. Its reputation in Europe was enough to ensure this. As a fodder plant, it was regarded as dangerous and had to be treated with great caution because of the poisonous principle it contained. Professor Kellner, a leading authority on stock feeding, wrote:— * "Fodder from lupines has always a heating effect and in some years all parts of the plants.

* The Scientific Feeding of Animals.

seeds, straw, chaff contain a deadly poison. This is a protein-like substance probably due to a fungus, which favoured by the weather emigrates to the plant. As the poisoning is generally fatal, it is advisable to make a feeding test for a few weeks on a valueless animal (a rabbit) in order to judge if the material is safe for food. If the lupine fodder is shown to be poisonous there is nothing to be done but to steam it for 4-5 hours at a pressure of 60-80 lbs. to the square inch to destroy its poisonous properties. Simple scalding or the conversion into brown or sour hay is not sufficient to render it harmless. .. . " And again—"Good results are obtained by steeping lupine seeds, which contain a bitter principle with poisonous properties, in cold water, for otherwise only small quantities are eaten by stock. Lupine seeds are very liable to cause distension and affect the milk, either reducing the quantity or giving it a bitter taste, etc."

"To get rid of these bitter substances the lupines are soaked for 24-36 hours in cold or lukewarm water, then boiled for an hour and finally washed well with cold water, the water being changed every 6-12 hours. . ."—"Sheep eat the seeds in the natural state the most readily of all animals."

With such a bad reputation given it by one of the foremost authorities of his time, it is not surprising that West Australian stock raisers believed it to be their duty to eradicate the plant from their holdings. Fortunately the "Blue" lupin which has survived is now found, for reasons at present unknown, to be innocuous to sheep. It may be that under our bright sunlight the poisonous principle is not developed or it may be that in this particular variety the poisonous principle is either absent or present to such a lesser extent that the sheep are not injured. Because of this latter possibility it is advisable to regard varieties other than the local blue one with suspicion until they have been proved to be harmless.

The "Blue" lupin or lupine is a hardy vigorous legume which, in common with other plants of the same class, is able to utilise the free nitrogen of the atmosphere to build up its tissues and thus indirectly make it available for succeeding crops. Its hardiness enables it to thrive on poor soils. This ability to exploit our soils for their minerals and the atmosphere for its nitrogen makes it a plant of the greatest economic value, particularly for those sandy and less fertile soils in which it will thrive. As the result of its ability to collect free nitrogen from the air its value for maintaining and increasing the fertility of light lands for cultural purposes has been recognised in European countries for many years, but in this State it has in addition an equal, if not greater value, because of its ability to improve the stock-carrying capacity of such lands when their distance from railways, or when other reasons render them unsuitable for cultivation. In this connection the great value of the lupin is due mainly to the fact that the seed produced by it is readily eaten by sheep, not only without injury to them, contrary to the expectations of those with European experience, but with considerable advantage to the sheep and profit to their owner. This plant also has an additional advantage in that, except in a very early stage, it is not readily eaten by stock, when other feed is available, until the seeds have been well formed, and, in consequence, it is one of the best means, and a natural method, of conserving fodder for use in the summer months, when it is most needed because the pastures are dry and scanty. Sheep are not put amongst the lupins until some time after the seed has been shed; they find and pick up the grain and fatten on it. An average crop of lupins is estimated to fatten and maintain four sheep to the acre. It must be emphasised that its value for stock is confined to sheep. This is because the sheep can and do acquire

the habit of finding the lupin seeds on the ground and picking them up to eat them. As cattle could not do this its value for dairying or for fattening cattle is negligible.

The seed of the Blue Lupin—the common variety—does not germinate readily, and, in consequence, there may be some difficulty in first establishing a lupin patch. The advantages, however, of lupins are so great that initial failures should not deter the settler; he should persevere until he has definitely proved that either his soil or his climate is unsuitable. Once established it does not require re-seeding annually, though botanically it is an annual. Owing to the reluctance of stock to feed on the green plant, except at certain brief periods of its growth, and to the habit of the plant to distribute the seeds when ripe, the lupin is in effect perennial, with all the advantages of that group of plants, but without the serious drawback of many of them, viz., the difficulty of eradicating them if desired, as may be the case when the ground on which the lupins are growing is desired for cultivation. The fact that sheep will eat it in its early stage, and that it will not make a second growth, provides the key to its eradication. If the stock are turned in while the plants are young they will eat them, and in this way the lupins can be controlled. The lupin has, therefore, all the advantages of a perennial without its disadvantages.

The local species of lupin, which has proved so useful and valuable in this State, is called the "Blue" variety because of the deep blue colour of its flowers. It is not known how it came to Western Australia, but the agricultural species is probably a "stray" from an introduced garden plant.

The seed is flat and circular, about 3/8in. in diameter and 1/8in. thick. It is grey in colour with brown spots giving it a slightly speckled appearance. The brown spots are sometimes very dense, giving the seed a brownish rather than a grey appearance.

Amongst the seeds of this species there are many "hard" seeds which do not germinate readily. This is not altogether a disadvantage, for this feature ensures a second and even a later germination should the plants of the first crop, consequent upon early rains, be destroyed by succeeding hot dry weather.

The seed pods mature unevenly. Flowering commences at the top. As they mature they burst open with a cracking noise and the seeds are scattered round the plant for a considerable distance, probably up to half a chain from the parent plant.

The best way of harvesting seed is by hand picking. Over large areas this is expensive, and is rendered the more difficult owing to the fact that all the seeds are not ripe at the same time. On large areas the seed is harvested with a header, stripper or harvester, the fingers of the comb being set wide enough apart to admit the lupin stalks. When harvested in this way, it is usual to take only the earliest matured pods in the upper part of the plant, the remaining pods being left so that as they ripen the seed will be scattered on the ground for sheep feed later on.

As a good crop of lupins will produce up to 40 bushels per acre, and a small quantity only of seed is required to establish the crop, it is suggested that the best way of securing seed is to sow a comparatively small area for the purpose and to hand-pick this.

Lupins have been grown over a wide range of country in Western Australia from Geraldton in the north to Albany in the south. They are subject to injury by frost though they have escaped injury at Merredin and Nar-

rogin where heavy frosts are often experienced. The reason for this is not known, but it may be that the aspect of the land on which they were grown was a contributing factor.

For best results with the "Blue" lupin a sandy soil is necessary. On the light jam soils of the Chapman Experiment Farm the lupin flourishes abundantly; on the heavier clay loams of the Merredin Experiment Farm its growth is meagre and unsatisfactory. Though in this instance, the difference in location may have an influence, in this connection it is significant that at Merredin the plant fails to form nodules on its roots, even after the soil had been inoculated with soil from an old lupin patch. Apparently the heavy soil has an inhibiting effect upon their formation.

One method of establishing the crop for the first time is to sow the seed at the rate of from 30 to 60 lbs. per acre amongst the stubble straw of the preceding wheat or oat crop, without any previous or subsequent cultivation, but better results are likely to be obtained when the seed is covered as the result of a light cultivation. It may also be established by sowing a pound or more of seed per acre with a wheat or oat crop, the object in this case being not to provide for a full crop at once but to allow the few lupin plants which grow in the crop to mature and scatter their seed, so as to provide for a thicker self-sown crop of lupins the succeeding year.

When desired, the lupin can be grown as a special crop, and in this case the ground should be well prepared as for wheat or oats and the seed sown in drills about 3ft. apart, placing the seeds so as to provide for plants to be 12 to 18 inches apart in the drills. A thick stand of plants is not advantageous, for the seed crop is what is required and it is found that the seed production is encouraged when individual plants have plenty of room. If lupin seeds germinated readily 3 to 4 lbs. per acre would be sufficient for planting in this way, but as only a small percentage germinates at once, it is advisable to sow at least twelve pounds per acre. No special machine is required to sow the seed. It can be planted with the ordinary seed and fertiliser drill, through either the oat or wheat tubes, but preferably the former owing to its size. If desired it can be mixed with and planted with the fertiliser.

Early planting is essential for optimum results. The best time for planting is therefore early in autumn. As a matter of fact the best crops are usually those which are self-sown as the result of the seed lying on the ground throughout the summer, covered by the stock whilst grazing, and germinating with the early rains in April.

At the Chapman Experiment Farm some experiments were conducted in 1924 to determine the most suitable depth at which to plant the seed.* The germination of seeds planted one and three inches deep was compared with those planted on the surface, and the percentage germination was:—

Surface	32
One inch deep	40
Three inches deep	19

On the light jam soil known to be poor in lime and potash, other experiments carried out at the same time showed no benefits as the result of applications of 15 cwt. of lime per acre or of 35lbs. sulphate of potash. It was also found that inoculation (*i.e.*, the introduction of the nitrogen collect-

* I. Thomas, "Journal of Agriculture, W.A.," December, 1924.

ing bacteria from an old lupin patch) was unnecessary, even though the land under trial had not previously carried lupins.

In view of the results of the experiments carried out at the Chapman Experiment Farm, sowing should take place early to derive advantage from the April rains, and the seed should not be planted deeply. An application of from 100 to 150 lbs. of superphosphate (22%) should be made at the time of planting.

Though the results of the experiments at Chapman Experiment Farm were as stated on the red jam soils, it is probable that on the lighter and whiter sands both potash and lime may be necessary as well as the introduction of the necessary bacteria from an old lupin patch. This is a matter to be determined only by trial.

After planting the seed, no subsequent treatment is given the crop other than to keep the stock away from it whilst it is young.

With the object of ascertaining whether there were other varieties hardier or more prolific even than the Blue Lupin, fifty new varieties were obtained, through the courtesy of Mr. J. M. Hattrick of the Potash Supply Company, in 1924, from Germany, the European home of the lupin. Since these have become acclimatised two, pink and red flowering varieties, indicate that they are more vigorous than the local blue one. This promise requires to be confirmed, and tests made to determine whether the grain is as free from injurious substances as the tried and valuable local variety.

THE F.A.Q. WHEAT STANDARD.

The decision of the Joint Grain Sub-Committee of the Perth and Fremantle Chambers of Commerce to recommend, after consultation with the London Corn Trade Association the adoption of a permanent standard instead of the variable F.A.Q. (Fair Average Quality) one for selling our wheat crop, marks a very distinct phase in the history of our wheat industry. It is the natural evolutionary advance which is inevitable and which should be made about this time.

Following upon the very early period of the wheat industry in Australia, when the grain was sold by sample and the commercial grain did not possess the definite characters that it does to-day, the adoption of the F.A.Q. standard was a very necessary, and was at that time a very suitable method for trading in Australian wheat. With the advance of years and the gradual development of wheat having definite and distinctive Australian characteristics, the disadvantages of the variable F.A.Q. standard need be tolerated no longer.

When submitting the case to the Joint Grain Committee of the Chambers of Commerce of Perth and Fremantle, advocating the change to a permanent standard, the following reasons were advanced:—

> There is great difficulty—amounting almost to practical impossibility—to collect truly representative samples of any current harvest. Because of this difficulty the F.A.Q. standard, particularly during the past two years, has been unsatisfactory in that it did not truly represent the quality of the crop. To overcome the unsatisfactory position which obtains with regard to the last two seasons an alteration in connection with the collection of samples and the procedure has been decided upon for the current season.

Had the F.A.Q. standard of the past season been representative of the crop it would have still been unsatisfactory, for it contained only 94.5 per cent. of millable grain, and permitted 5.5 per cent. of foreign matter and screenings of little value to the purchaser. The percentage of millable grain is much lower than can be obtained with Australian harvesting machinery. Under field conditions at least 98 per cent. of millable grain can be obtained. A standard with such a low percentage discourages good workmanship on the farm, and should not receive the endorsement of the joint Chambers of Commerce as being sufficient to meet the commercial requirements of the grain trade in this State.

Because of the position which obtains under the F.A.Q. system, and which allows an unnecessarily high percentage of non-millable material, many farmers now cover up, or remove the tailing screens from their harvesters, thus deliberately lowering the commercial value of our main agricultural product by including a much larger percentage of unmillable material—foreign matter and screenings—than is necessary. How great is the economic waste which permits unnecessary non-millable material in the standard will be seen from the following figures, which show the tonnage involved in handling different percentages of the wheat exported last season, viz., 26,976,158 bushels or 722,575 tons:—

1	%	is equivalent to	7,225 tons.
2	%	„	14,450 „
3	%	„	26,675 „
(F.A.Q.) 5.5	%	„	39,737 „

An additional 20 to 25 per cent. wastage is also incurred in connection with wheat transported to and handled in the flour mills.

The official recognition of an average standard—F.A.Q.—tends to increase the quantity of non-millable material. The adoption of a fixed standard would prevent this and limit the economic waste.

Theoretically the F.A.Q. standard should be representative of the whole of the State crop. The joint Chambers make a very earnest attempt to ensure that this is what the F.A.Q. standard shall be. It is, however, practically impossible to achieve this. Despite the special efforts which are being made this year the standard arrived at will not be representative of the whole of our crop, but will represent *only* the quality of the wheat exported *prior to the end of January*. It will not represent either the wheat stacked at, or being carried to, country sidings. Some of this is likely to have been harvested late in the season, and may be weathered, dull, or even bleached. Further, it is inconceivable that any disinterested person associated with the actual fixing of the standard would allow the inclusion of samples of badly bleached, sprouted, or badly smutted grain.

An annual variable F.A.Q. standard cannot be fixed until late in the season—usually about the middle of February. Normally by that time 40 per cent. or more of the crop has been shipped, and a greater percentage before the standard arrives in Great Britain. In 1923, for which year figures are available, 63 per cent. of the crop had been shipped before the F.A.Q. sample for that year had been received in

* This quantity was to 31st October, 1928. The total for the season 1st December, 1927, to 30th November, 1928, was 27,231,129 bushels.

Great Britain. Buyers overseas had thus purchased more than half our export wheat without being officially informed what they were buying. This fact was adversely commented on by the Chairman of the Liverpool Corn Trade Association.

Because of its unavoidable unsatisfactory character the Western Australian F.A.Q. sample is not regarded as seriously in Great Britain as a commercial standard endorsed by the joint Chambers should be. In this connection it has been stated by a Western Australian eye-witness that the official W.A. standard in London was labelled "W.A. F.A.Q. Standard *said to weigh* 62lbs. per bushel."

Further, because of the unsatisfactory character of the F.A.Q. standard, both shippers and overseas buyers must, in effect, make purchases and sales on the basis of what they *consider* the quality of W.A. wheat *should* be, *i.e.*, in accordance with a fixed unofficial standard based on their past experience. The following table, which gives the main characteristics of the Western Australian F.A.Q. standard since 1921-22, shows what this experience has been:—

Year.	Bushel weight.	Foreign matter.	Screenings.	Total.	Millable Grain.		
					Yearly.		Averages.
1921–22	63	·90	1·77	2·67	97·33		...
1922-23	62	·88	1·55	2·43	97·57		97·45
1923–24	62¾	·40	2·51	2·91	97·09		97·33
1924-25	62½	1·08	1·92	3·00	97·00	Average 97·16	97·24
1925–26	62	·85	2·02	2·87	97·13		97·22
1926–27	61¾	·35	2·78	3·13	96·87		97·16
1927–28	61½	·75	4·75	5·45	95·5		96·92

It is reasonable to suppose that if buyers were dealing on a definite basis, as in the case of a fixed official standard, they would be prepared to pay the top price for wheat of that standard quality, which would obviously be a better price than when buying on a basis which is indefinite, and when, in consequence, unknown contingencies have to be provided for.

Variable standards are not endorsed by political leaders, nor are they in accordance with modern commercial practice. At a recent Premiers' Conference the following resolution was passed:—

> That this Conference is strongly of the opinion that it is undesirable to lower established standards of export products to meet temporary or seasonal conditions, and that the Commonwealth Government be informed accordingly.

For some time there have been fixed standards for apples and pears, and no variations are allowed to meet the peculiarities of particular seasons. After serious consideration, and in the light of experience, dried fruit growers have adopted—as far as is possible—permanent standards. The only reason they are not absolutely permanent is because of the difficulty in finding a suitable permanent material (like wax or plasticine) in which to model permanent replicas of the standards desired. No such difficulty exists with regard to wheat.

In Western Australia there is a fixed standard for oats known as "The W.A. Standard Feed Oats." Its description is:—

W.A. Standard Feed Oats shall be bright, sound and free from musty, smutty or other objectionable smell. It shall contain by weight not less than 96 per cent. of oats; not less than 14 per cent. of prime oats, and not more than 6 per cent. of screenings oats; nor shall there be more than 1/20th per cent. by weight of the seeds of "Speargrass." The bushel weight shall not be less than 37 lbs.

Already there is one fixed standard for wheat in use in this State. This is known as the "W.A. Standard White." It was forced into existence by the requirement of certain sections of the export trade. It has been in use for Government certificated cargoes each year for the past five years from the opening of the season until the fixing of the F.A.Q. standard by the joint Chambers. Last season 7,546,116 bushels (202,128 tons), or 28 per cent. of the export wheat, was shipped according to this fixed standard, and in 1924 the proportion of the crop shipped under Government certification prior to the fixing of the F.A.Q. standard was 61.3 per cent.

The United States of America and Canada have adopted permanent standards, despite the different types of wheat grown in those countries. In Western Australia (and Australia) there is only one type, and therefore the need for one standard. Such a standard should be agreed upon and recognised officially by the joint Chambers. It is not suggested that it should be the present W.A. standard or any particular one.

Two main factors will decide what the standard should be. These are—

The percentage of millable grain; and
The weight per bushel.

For several consecutive years the Western Australia F.A.Q. standard was the highest in the Commonwealth, and in consequence became of high repute on the overseas markets. This reputation can be better maintained by the adoption of a fixed standard rather than by a continuance of the present variable F.A.Q.

Just as the F.A.Q. system supplanted a less suitable one, so it is believed that, because of our greater expansion, it is now desirable that our present F.A.Q. standard, which has served its turn, should give place to a more modern one of trading according to permanent standards, a system which is more in keeping with the march of standardisation, and which will bring the Australian system in line with the other great wheat producing countries of Canada and the United States of America.

The decision in favour of a permanent standard is in accordance with modern commercial practice. Its usefulness is analagous to that of a foot rule with its recognised definite standards of measurement. Tanning extracts are bought and sold according to the percentage of tannin they contain, likewise our wool is sold according to the quantity and quality of the clean wool fibre it contains. What is more reasonable than that our wheat should be sold according to the quantity and quality of the millable grain it contains.

Not many years ago, in parts of Western Australia, wool was bought "all in," which is similar to buying wheat according to the variable F.A.Q. standard. It would be difficult to induce those who are accustomed to selling their wool according to the permanent standard of quantity and quality to revert to the old method.

The proposed permanent standard is very similar to that of the F.A.Q. standard fixed, in any year, for several years past. A comparison with the proposed standard and the present F.A.Q. (1928-29) is as follows:—

F.A.Q. STANDARD.		W.A. STANDARD WHITE WHEAT.	
The Grain to be Sound and fit for Shipping.		*The Grain to be Sound and fit for Shipping.*	
Quantities:—		*Quantities:*—	
Bright and Sound Grain ..	95.1%	Bright and Sound Grain ..	95.5%
Total Milling Grain ..	97 %	Total Millable Grain ..	97 %
Total Foreign Matter ..	3 %	Total Foreign Matter ..	3 %
Bushel Weight—62½ lbs.		*Bushel Weight of Cleaned Grain*—62 lbs.	

The adoption of the permanent standard will in no way interfere with or disorganise existing methods of dealing with the grain crop. The present method of buying from farmers by sample, and according to the judgment of the agent, will continue: but, because of an accurate definition of what the standard consists, the adjustment of differences in the case of disputes, either overseas or in the State, can be settled by skilled judgment with less difficulty than in the past.

The proposed standard conforms to the conditions believed to be necessary. It denotes the Australian character of our wheat and states its quality, and further it is distinctive and simple.

Though the wheat grower is the one most concerned financially in the fixing of commercial trading standards for the sale of his crop, millers and wheat merchants are also interested. It is, therefore, considered desirable that they, as well as the grower—because changes in established methods should be made with discrimination—ought to be consulted before the details of any standards are finally decided upon. The decision of the Chambers of Commerce to consult the London Corn Trade Association as representing the overseas buyers before the final details of the standard are decided is therfore desirable, sound, and reasonable. Though there may be some difference of opinion as to details it is difficult to conceive of any objection that can be raised against the logical introduction of a permanent trading standard. None so far have been raised though there is the usual natural disinclination to make any change, but in this case, as has been shown there is little or no alteration in existing methods. There is simply the official recognition of a standard which the merchants have been compelled to use, consciously or unconsciously during the early part of every season. It is expected that the proposed permanent standard will be welcomed, for the advantages of having a permanent standard are so obviously greater than working according to a variable one. These advantages are summed up in a report of a former Secretary of the United States Department of Agriculture, who wrote:—

"Federal grain standardisation, by establishing a uniform basis for interstate trading, lessens the chances of misunderstandings and disputes, gives confidence to buyers and sellers, and facilitates business at every stage in the movement of grain from the farm to consuming centres. It thus tends to reduce distribution costs, and reduction of distribution costs is of practical value to the farmer at any time. It is especially useful to him in times of low prices when inefficient distribution may saddle him with an intolerable burden of expense.

YILGARN DISTRICT CROP COMPETITION.

Judge: G. K. Stevens,
Manager, Yilgarn Experiment Farm.

The settlers of the Yilgarn district are to be congratulated on again conducting a crop competition during the past season. Fifteen entries were received, Corinthia, N.W. Bullfinch, N.E. Bullfinch, and Moorine Rock being represented. It is pleasing to note that wider interest is being taken in the competition, which was divided into two sections, one for crops grown on fallowed land and the other for crops grown on unfallowed land. The area for competition was 50 acres instead of 10 acres as was the case the previous year.

The following awards were made:—

YILGARN DISTRICT CROP COMPETITION, 1928 (50 Acres).

Judge: G. K. Stevens, Manager, Yilgarn Experiment Farm.

Fallowed Section.

Name	Address.	Variety.	Yield. 40 points.	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth 10 points.	Total. 100 points
Basenger Bros.	N.E. Bullfinch	Gluyas Early	19	18	13	14	9	73
Cass-Smith, W. P.	N.W. Bullfinch	Gluyas Early	17	18	14	14	9	72
Pickworth, W. (No. 1)	Moorine Rock	Gluyas Early	18	18	14	14	8	72
Jukes, J. ...	N.W. Bullfinch	Nabawa ...	19	18	14	11	8	70
Mason, C. ...	N.E. Bullfinch	Gluyas Early	20	16	14	12	8	70
Bamber, W. ...	N.W. Bullfinch	Gluyas Early	16	17	14	13	9	69
Copley, N. ...	N.W. Bullfinch	Gluyas Early	15	17	14	14	8	68
Copley, C. ...	N.W. Bullfinch	Nabawa ...	14	16	14	13	7	64
Pickworth, W. (No. 2)	Moorine Rock	Nabawa ...	16	15	14	12	7	64

Unfallowed Section.

Davies, F. & J.	Corinthia ...	Gluyas Early	14	18	14	14	9	69
Carstairs & Liddell	Moorine Rock	Nabawa ...	17	17	14	12	8	68
Pickworth, W. (No. 3)	Moorine Rock	Nabawa ...	12	17	14	14	8	65
Bamber, Mrs. W.	N.W. Bullfinch	Gluyas Early	10	18	14	14	8	64
Kent, R. ...	N.W. Bullfinch	Gluyas Early	7	18	13	14	9	61
Stopher, R. ...	Corinthia ...	Gluyas Early	8	18	13	13	7	59

The winning crop on fallow was grown by Basenger Bros., of N.E. Bullfinch. This was an even crop of good height. Although the heads were not numerous they were well developed.

In the unfallowed section the crop of F. and J. Davies secured first place. This was grown on heavy Salmon Gum and Gimlet country. The crop of Mr. Carstairs, of Moorine Rock, although yielding better, lost points owing to weed growth and the presence of admixture, and was not so even in height. The land had been cleared of scrub by being ploughed with a disc implement.

Bearing in mind the adverse growing conditions which were experienced in this area, the yields obtained are surprisingly good. The average yield for those crops on the fallowed land was 17.1 bushels, and for those on unfallowed land 11.1 bushels. Being new, or comparatively new land, the crops were fairly free from weeds. In a few cases salt bush and small scrub were present. Generally the crops were fairly free from admixture, but in several cases barley was present to a slight degree, and in one case very prevalent. In three crops only was disease present, and in each instance it was a trace of Ball Smut. In the majority of crops the growth was fairly even.

The rainfall, as officially recorded at Southern Cross and Bullfinch, is given below:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
Southern Cross	95	...	56	23	130	71	156	100	45	17	519	...	...	...
Bullfinch	141	...	51	53	110	74	192	83	60	61	580	3	64	892

The details of the cultural methods of the competitors are as hereunder:—

YILGARN DISTRICT CROP COMPETITION.

FALLOWED SECTION.

Competitor.	Basenger Bros.	Cass-Smith, W. P.	W. Pickworth (1)	J. Jukes.
Years cropped ...	First	Second	First	First
Timber	Salmon, Gimlet scrub	Mallee	Morrel	Salmon, Gimlet, Morrell
Ploughed	August	May, 1927	August	June
Type of plough ...	Sundercut	Gaston disc	Sundercut	Gaston disc
Depth	3½ to 4in.	4½ to 5in.	2½in.	5in.
Condition of land at time of ploughing	Bit dry	Good	Good	Good
Other cultivations	Combined in	Cross ploughed in July with Sundercut 3in. Cultivvated Sept. 2½ to 3in. after 4in. rain. Combined in	Sundercut in August. Combined in	Cultivated in September before seeding. Combined in.
Variety	Gluyas Early	Gluyas Early	Gluyas Early	Nabawa
Planted	16th May	13th May	18th May	9th May
Rate of Seed ...	30lbs.	30lbs.	30lbs.	26lbs.
Graded	No	Yes	Yes	No
Treated	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of Super ...	30lbs.	50lbs.	60lbs.	56lbs.
Disease	Smut	*Nil*	*Nil*	*Nil*

YILGARN DISTRICT CROP COMPETITION.—CONTINUED.

FALLOWED SECTION—*continued.*

Competitor.	Mason.	Bamber, W.	N. Copley.	C. Copley.	W. Pickworth (II).
Years cropped	First	First	Third	Second	Third
Timber ...	Salmon, Gimlet, Jam	Salmon, Gimlet Scrub	Salmon, Gimlet, Mallee	Salmon, Gimlet	Gimlet
Ploughed ...	June	August	June	July	September
Type of plough	Sundercut	Sundercut	Sundercut	Sundercut	Sundercut
Depth ...	3in.	3½in.	4in.	4in.	3in.
Condition of land at time of ploughing	Good	Good	Good	Good	Good
Other cultivations	Combined in	Combined in	Sundercut in Sept. after 4in. rain. Combined in	Sundercut after 4in. rain in Sept. Combined in	Sundercut Oct. Combined in
Variety ...	Gluyas Early	Gluyas Early	Gluyas Early	Nabawa	Nabawa
Planted ...	8th May	5th May	12th May	9th May	3rd May
Rate of Seed	36lbs.	30lbs.	30lbs.	25lbs.	30lbs.
Graded ...	No	Yes	Yes	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of Super	40lbs.	40lbs.	55lbs.	55lbs.	70lbs.
Disease ...	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*

NON-FALLOWED.

Competitor.	F. & J. Davies	Carstairs and Liddell.	W. Pickworth (III.)	Mrs. Bamber.	R. Kent.	R. Stopher.
Years cropped	Second	First	Third	First	Second	First
Timber ...	Salmon and Gimlet	Sand plain, low quality	Gimlet and Morrell	Mallee and Jam	Morrell, Gimlet Jam	Salmon and Gimlet
Ploughed ...	...	October	No	Before seeding	...	...
Type of Plough	...	Shearer disc	...	Sundercut	...	...
Depth ...	...	3in.	...	2½ to 3in.	...	...
Condition of land at time of ploughing	...	Good	...	Good	...	...
Other cultivations	Cultivated in March, combined in	Combined in	Cultivated in April, combined in	Combined in	Cultivated in March, combined in	Combined in
Variety ...	Gluyas Early	Nabawa	Nabawa	Gluyas Early	Gluyas Early	Gluyas Early
Planted ...	9th May	26th April	10th May	16th May	9th May	26th May
Rate of Seed	34lbs.	26–45lbs.	25lbs.	30lbs.	33lbs.	30lbs.
Graded ...	Yes	Yes	Yes	Yes	Yes	No
Treated ...	Dry	Dry	Dry	Dry	Dry.	Wet
Rate of Super	65lbs.	90lbs.	45lbs.	40lbs.	60lbs.	45lbs.
Disease ...	*Nil*	*Nil*	*Nil*	*Nil*	Smut	Smut

CORRIGIN DISTRICT CROP COMPETITION.

Judge: G. L. THROSSELL, Dipl. Agric.,
Agricultural Adviser.

The crop competition conducted by the Corrigin Agricultural Society was a local one. It was judged under the same conditions and the same scale of points as those of the Royal Agricultural Society's Crop Competitions.

Nine entries in all were received, six of which were submitted for inspection.

The rainfall for 1928 recorded up to the end of October is shown in the following table. Although the rainfall towards the end of the season fell in rather light showers, and the season "cut off" early, the rainfall was sufficient to grow good crops. Had good rains fallen in October, much heavier yields could have been expected.

——	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sept.	Oct.	Total, May to Oct.
Kurren-Kutten ...	75	...	...	35	197	107	473	265	111	55	1,208
Corrigin	98	...	19	68	146	85	434	279	124	66	1,134

The points awarded to the various competitors are as follow:—

CORRIGIN DISTRICT AGRICULTURAL SOCIETY.

50-ACRE CROP COMPETITION, 1928.

ZONE 7.

Judge: G. L. Throssell, Agricultural Adviser.

Competitor.	District.	Variety.	Estimated Yield. 40 points	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Bremner, J. R. & Son	Kurren-Kutten	Gluyas Early	28	19	13	14	9	83
Bartlett, Arthur	Gorge Rock	Dollar ...	24	19	11	13	7	74
Taylor, J. B....	Kunjin ...	Gresley ...	20	19	12	11	8	70
Cronin, J. ...	Kurren-Kutten	Nabawa ...	18	17	11	12	8	66
Ding, J. B. ...	Corrigin ...	Ford ...	12	19	13	14	8	66
Evans, M. ...	Kunjin ...	Minister ...	16	17	12	12	7	64

Messrs. J. R. Bremner & Sons, of Kurren-Kutten, gained first place with 83 points, with a splendid crop of Gluyas Early, which was calculated to yield 28 bushels per acre. This crop easily surpassed those of the other competitors, and is an example of what can be done with good farming methods. Planted with a "combine" on well-worked fallow, the variety Gluyas Early was sown on 22nd and 23rd May at the rate of 45 lbs. of graded and dry-pickled seed, with 100 lbs. of superphosphate per acre. The crop had stooled well, was very even and dense, and of a convenient stripping height. This entry was very true to type, and the fact that only one or two

"strangers" were found shows the carefulness of the farming operations. There was a slight infection of "Take-all," and it was only on these patches that the very little weed growth was noticed.

The crop of "Dollar" entered by Mr. Arthur Bartlett, of Gorge Rock, was awarded second place with 74 points. This entry was not as even as the winning crop, but was well headed and was calculated to yield 24 bushels per acre. It was very free of weeds, but was rather badly infected with "Take-all." Loose smut was also evident, as well as a trace of both Bunt and Flag Smut. It was free of barley, but had a small admixture of foreign ears.

The following table summarises the cultural methods of the competitors:—

CORRIGIN DISTRICT CROP COMPETITION.

Competitor.	J. Bremner & Sons.	Arthur Bartlett.	J. B. Taylor.	J. Cronin.	J. B. Ding.	M. Evans.
Years cropped	Four crops	Five crops	...	Three crops	First crop	Two crops
Rotation ...	2 years. Fallow, crop	2 years. Fallow, crop	2 years. Fallow, crop	2 years. Fallow, crop.	...	3 years. Fallow, crop, stubble
Timber ...	Gimlet and tea-tree	Jam, York, and Salmon	Salmon and York Gum	Gimlet, Boree and Morrell	Sand plain	Salmon, White Gum and Jam
Ploughed ...	Early June	Middle June	Late August	Late June	End August	Late June
Type of Plough	Sundercut	Mouldboard	Mouldboard	Disc	Cultivating Disc	Mouldboard
Depth ...	3ins.	6ins.	4ins.	3½ins.	4ins.	4½ins.
Condition of land at time of ploughing	...	...	...	...	...	...
Other cultivations	Tandem disced (on account of self sown) in Aug. Springtyned to full depth in Sept. Harrowed end of Sept., scarified in Oct.	Springtyned early in Sept. to full depth. Cultivated twice (crossed) with springtyne in March.	No cultivations Small strip tandem disced in March	Springtyned to full depth beginning Aug., again in Sept. In patches (weeds) in Oct., Again prior to seeding	Harrowed in March	Harrowed in July. Scarified in Sept. Harrowed end of Sept.
Variety ...	Gluyas Early	Dollar	Gresley	Nabawa	Ford	Minister
Planted ...	22nd and 23rd May	1st week May	End May	End April, beginning May	End April	Early April
Type of Drill	Combine	Disc	Combine	Disc	Disc	Hoe
Rate of Seed	45lbs.	60lbs.	60lbs.	50lbs.	45lbs.	30lbs.
Graded ...	Yes	Yes	Recleaned	Yes	Yes	No
Treated ...	Dry pickled	Dry pickled	Dry pickled	Formalin	Dry pickled	No
Rate of Super	100lbs.	90lbs.	90lbs.	70lbs.	95lbs.	120lbs.
Disease ...	Takeall. Trace of Flag Smut	Takeall. Loose Smut. Traces Flag Smut and Bunt	Takeall. Traces Loose Smut. Flag Smut and Septoria	Takeall. Loose Smut and Traces of Bunt	Trace Takeall and Septoria	Takeall. Septoria Loose Smut, Stem Rust and Trace Flag Smut

PHILLIPS RIVER DISTRICT CROP COMPETITION.

Judge: A. S. Wild, B.Sc. (Agric.),
Agricultural Adviser.

The Phillips River Agricultural Society, in holding a crop competition during 1928, has taken a step well worthy of the district. The settlers in this locality are to be congratulated for the zeal which, undeterred by the vicissitudes of the season, prompted them to proceed with their intentions and surmount some of the difficulties arriving through their isolation from the other wheat-growing districts. It is confidently expected that, by a participation in this, and eventually in the Royal Agricultural Society's Fifty Acre Crop Competition, the farmers of the district will be assisted in gaining knowledge and further experience in wheat culture, and that the town of Ravensthorpe will become a striking example of the metamorphosis of Mining to Agriculture.

The conditions of the competition were that the areas inspected were to be at least 25 acres in extent, planted with the one variety, and judged under the scale of points applying to the Royal Agricultural Society's Crop Competitions.

Ten competitors submitted crops for inspection by the Judge, the awards being as follow:—

PHILLIPS RIVER DISTRICT CROP COMPETITION.

Judge: A. S. Wild, Agricultural Adviser.

Competitor.	District.	Variety.	Yield. 40 points	Freedom from Weeds. 20 points.	Freedom from Disease. 15 points.	Freedom from Admixture. 15 points.	Evenness of Growth. 10 points.	Total. 100 points.
Bebbington, H.	Ravensthorpe	Yandilla King	17	19	14	13	8	71
Smith, W. H.	Kuliba ...	Nabawa ...	17	19	13	13	8	70
Reynolds, W. E.	Ravensthorpe	Nabawa ...	15	18	14	14	8	69
Barrett Bros....	Ravensthorpe	Merredin ...	14	18	14	14	8	68
Chapman, I. J.	Kuliba ...	Nabawa ...	13	19	14	13	9	68
Chambers Bros.	Ravensthorpe	Merredin ...	15	17	13	13	8	66
Blake, J. ...	Ravensthorpe	Merredin ...	9	19	14	13	7	62
Buckie, H. ...	Ravensthorpe	Yandilla King	10	18	14	12	7	61
Dasborough, S. C. B.	Ravensthorpe	Nabawa ...	8	19	13	14	7	61
Daw, F. E. ...	Ravensthorpe	Nabawa ...	8	19	14	13	7	61

The winning crop was that of Mr. H. Bebbington, the variety being "Yandilla King," calculated to yield 17 bushels per acre. The land, cropped for the first time, had been ploughed with a disc plough to a depth of 2 inches to 3 inches the previous June. Further working consisted in its being skim ploughed with a disc implement during the month of November and again immediately before drilling. The crop was planted during the second week in May with 45 lbs. per acre of graded seed which had been treated with copper carbonate for the prevention of Ball Smut. Superphosphate was applied at seeding at the rate of 75 lbs. per acre.

This crop was very free of disease and weeds. It lost points for admixture, barley being prevalent throughout, as well as a few plants of strange varieties of wheat.

Mr. W. H. Smith's crop of "Nabawa," which was placed second, was grown on scrub plain country within about 10 miles from the coast towards Hopetoun. It was planted with 60 lbs. per acre of graded seed, with an application of 90 lbs. of superphosphate per acre on land which had been ploughed for this, its first crop, the previous July. This crop, calculated to

yield 17 bushels per acre, lost points for disease (traces of Flying Smut and Ball Smut). It was fairly free of weeds and admixture.

The monthly rainfalls for 1928, together with the average rainfalls for both Ravensthorpe and Hopetoun, are given below:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.							Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total			
Ravensthorpe, 1928	114	17	181	52	95	65	198	229	91	45	723	48	27	1,162
Ravensthorpe, Average	53	77	135	146	173	152	188	173	161	171	1.018	100	115	1,644
Hopetoun, 1928	157	2	103	139	174	119	373	186	139	59	1,050	38	26	1,515
Hopetoun Average	53	73	145	166	253	248	265	228	196	175	1,365	101	109	2,012

In common with other portions of the wheat belt, the Phillips River area suffered through the spasmodic rainfall of the season, October being particularly dry. Consistent drying winds during the growing period were responsible for much evaporation of moisture, the loss of which could be ill afforded. In years of normal rainfall it is anticipated, that this district will, with correct methods of cultivation, grow crops which will compare favourably with those of other portions of the wheat belt having similar classes of soil.

The table given below summarises the methods of cultivation at present adopted by the competitors:—

PHILLIPS RIVER DISTRICT CROP COMPETITION.

Competitor ...	Bebbington, H.	Smith, W. H.	Reynolds, W. E.	Barrett Bros.	Chapman, I. J.
Years cropped	First crop	First crop	Second crop	First crop	First crop
Timber ...	Mallee, Mort, Mallet and some Gimlet	Scrub plain	Mallee scrub, plain of fair quality	Gimlet and Mallee, red loamy soil	Scrub and blue mallee, plain country
Ploughed ...	July	July	Late August	July	July
Type of plough	Disc	Disc	Mouldboard	Mouldboard	Disc
Depth ...	2 to 3ins.	4ins.	4ins.	3½ to 4ins.	3ins.
Condition of land at time of ploughing	Varying	Good	Fair	Dry	Good
Other cultivations	Skim ploughed with disc implement in Nov. and again before drilling	Cross-disced to a depth of 3 inches in Mar. Disc harrowed in front of drill	Sringtyne cultivated in Sep. and again in Oct.	Disc-cultivated after Oct. rains and again just before drilling. Portion drag harrowed behind drill	Cross-disced to a depth of 2½ to 3 ins. Mar. disc harrowed in front of drill
Variety ...	Yandilla King	Nabawa	Nabawa	Merredin	Merredin
Planted ...	Second week in May	Middle of June	Middle of May	3rd week in May	End of May
Rate of Seed...	45lbs.	60lbs.	45lbs.	55lbs.	60lbs.
Graded ...	Yes	Yes	No	Yes	Yes
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of Super	75lbs.	90lbs.	60lbs.	82lbs.	113lbs.
Disease ...		Traces of Flying Smut and Ball Smut	Trace of Flying Smut	Trace Septoria	Traces of Flying Smut and Septoria

PHILLIPS RIVER DISTRICT CROP COMPETITION—*continued.*

Competitor ...	Chambers Bros.	Blake, J.	Buckie, H.	Dasborough, S. C. B.	Daw, F. E.
Years cropped	About 9th crop	3rd crop	3rd crop	2nd crop	1st crop
Timber ...	Salmon and Gimlet	Mallee and Gimlet, heavy red soil	Mallee, Salmon Gum and Yate	Gimlet and Mallee. Fluffy soil	Mallee
Ploughed ...	June and July	Half in June and half in Feb.	End of May	Early June	
Type of plough	Mouldboard	Mouldboard	Springtyne cultivator	Disc	Disc
Depth ...	3½ to 4in.	3½in.	2in.	2½in.	
Condition of land at time of ploughing	Good	Good in June, but dry in March	Fair	Good	Wet
Other cultivations	Harrowed twice and Springtyne cultivated twice in Sring. Springtyne cultivated in autumn and harrowed immediately prior to seeding	June ploughing, harrowed in June, Springtyne cultivated in July and Sept. and all Springtyne cultivated before drilling	Drilled with combine in opposite direction to previous cultivation	Disc-harrowed immediately prior to seeding	Cross-ploughed with disc implement and Springtyne cultivated
Variety ...	Merredin	Merredin	Yandilla King	Nabawa	Nabawa
Planted ...	Middle of May	End of June	6th June	End of June	
Rate of Seed	60lbs.	60lbs.	43lbs.	73lbs.	50lbs.
Graded ...	Yes	Yes	No.	No.	
Treated ...	Dry pickled	Dry pickled	Dry pickled	Dry pickled	Dry pickled
Rate of Super	65lbs.	96lbs.	70lbs.	90lbs.	56lbs.
Disease ...	Traces of Flying Smut, Flag Smut and Septoria	...	...	Septoria	...

It is pleasing to note the competitors paid particular attention to the treatment of their seed; all treated their seed wheat with copper carbonate for the prevention of Ball Smut, and the majority graded their seed.

The rates of seeding varied from 45 lbs. to 73 lbs. per acre. The latter quantity is excessive, particularly with the freer stooling varieties such as "Nabawa." Experiments conducted at the different experiment farms have shown that amounts greater than 60 lbs. per acre are neither necessary nor economical.

The varieties planted by the competitors are undoubtedly worthy of favourable comment. They are limited to "Yandilla King," "Nabawa" and "Merredin," all of which are considered suitable for the district.

Regarding wheat varieties, it should not be overlooked that timely seeding is a most important factor. The general maxim is to plant late varieties early, and early varieties late. A general recommendation to the settlers of this district is to plant a late variety such as "Yandilla King" at the end of April and up to the middle of May, a mid-season variety such as "Nabawa" during the month of May, and an early variety such as "Merredin" towards the end of May, the main "seeding" month.

Experiments have demonstrated that, for light country, late and mid-season varieties planted early are more profitable than early varieties planted late.

The preparation of the seed bed is a subject which has demanded—and received—much patient inquiry, research, and demonstration. It has been established that four inches is sufficient depth to plough, the class of soil determining the type of plough (disc or mouldboard) to use. It must be remembered, however, that whatever type of implement be used the work should be done thoroughly.

Experiment results show that higher yields are obtained from land which has been fallowed during the early winter months than that ploughed later in the fallowing season. The cultivation immediately following the initial ploughing should be deep, and preferably with a springtyne implement so that the clods are brought to the surface, allowing the finer soil to form a consolidated seed bed below. It is unwise, however, to cultivate deeply during the summer and autumn months. The use of the disc cultivating implement during the months prior to seeding should be avoided unless the condition of the land at that time demands a heavier implement than the springtyne cultivator. Should the use of a disc implement be necessary, care should be taken not to cultivate too deeply.

It is expected that the next crop competition of the Phillips River Agricultural Society will be for an area of 50 acres, planted on fallowed land, and that the competition will become associated with the Royal Agricultural Society's competition which has done so much to assist the progress of wheat growing in this State.

VARIATION IN WEIGHT OF EGGS.

W. T. Richardson,
Poultry Adviser.

It is contended in some quarters that there is little variation in the weight of eggs laid by individual birds if they produce the standard grade egg four or five months after commencing to lay, *e.g.*, 2 ozs. (24 ozs. to one dozen eggs); hence it becomes unnecessary to weigh eggs individually. Following the above line of reasoning one would naturally conclude that an average of 2 ozs. attained during, say, July and August would ensure a similar average for the remaining months of the laying season.

To demonstrate how erroneous this impression is the following figures have been taken from records of performances obtained at Muresk Egg Laying Competition, where every egg laid is weighed. The records under review have been taken from two different tests, so that seasonal influences may not be held responsible for the variations noted. These examples have been

selected from a number of similar ones. Naturally, in some cases the variation in weight is more pronounced than in others.

VARIATION IN WEIGHT OF EGGS LAID BY INDIVIDUAL BIRDS AT MURESK EGG-LAYING COMPETITION.

1ST TEST—FROM 10TH APRIL, 1927, TO 31ST MARCH, 1928.

NOTE :—24ozs. to 1 doz. eggs = 2oz. egg.

Month.	Bird No.	Ounces to 1 dozen eggs.											
		30.	29.	28.	27.	26.	25.	24.	23.	22.	21.	20.	19.	18.
April	1 W.L.	...	...	...	...	...	...	1	3	6	2	3	...	...
May	,,	...	...		moult.			...	...	...	1	...	...	...
June	,,	1	...	...	...	6	7	3	...	...	...	...	...	...
July	,,	...	...	2	2	9	8	1	...	...	...	...	...	...
August	,,	...	...	...	3	7	11	4	...	...	...	...	...	...
September	,,	...	...	1	4	2	8	8	1	...	...	...	...	...
October	,,	...	...	...	...	2	2	5	16	5	...	...	...	...
November	,,	...	...	...	...	...	...	...	4	13	12	...	...	...
December	,,	...	...	...	...	...	...	...	2	5	16	3	3	...
January	,,	...	...	...	...	...	...	7	5	6	5	2	...	...
February	,,	...	...	...	...	...	3	5	12	1	...	...	...	...
March	,,	...	...	...	...	...	3	4	2	...	...	...	...	...
April	3 W.L.	...	...	...	...	...	...	1	2	5	4	...	...	...
May	,,	...	...	...	...	2	8	7	4	...	1	...	...	...
June	,,	...	...	6	2	7	4	1	...	...	...	...	...	...
July	,,	...	...	6	4	9	2	...	...	...	...	...	...	...
August	,,	...	...	...	3	5	10	3	...	...	1	...	...	...
September	,,	...	...	1	...	2	5	18	1	...	...	...	...	...
October	,,	...	...	...	1	...	2	11	9	2	...	...	...	1
November	,,	...	...	...	...	...	1	6	14	4	2	...	...	...
December	,,	...	...	...	...	...	1	6	9	5	3	...	...	...
January	,,	...	...	...	...	2	2	5	8	5	3	...	...	...
February	,,	2	...	...	...	...	3	10	5	...	1	...	...	...
March	,,	1	...	1	2	...	5	1	7	3	...	...	...	2
April	5 W.L.	...	...	...	...	...	...	...	2	...	2	1	...	1
May	,,	...	...	...	...	...	...	8	6	...	...	...	...	...
June	,,	...	...	...	2	4	10	2	...	1	...	...	...	...
July	,,	...	...	1	3	6	6	2	1	...	...	...	...	...
August	,,	...	...	...	2	14	8	...	...	...	...	...	...	...
September	,,	...	...	...	4	8	11	1	...	...	...	...	...	...
October	,,	...	...	...	...	5	9	5	1	2	...	...	...	...
November	,,	...	...	...	...	2	11	9	2	...	...	...	...	...
December	,,	...	...	...	...	...	5	10	8	2	...	...	...	...
January	,,	...	...	...	...	...	10	11	3	...	...	...	...	...
February	,,	...	...	...	1	4	8	11	...	...	...	...	...	...
March	,,	...	...	1	3	3	9	5	1	...	...	...	...	...
April	12 B.O.	...	...	...	...	...	...	...	2	7	4	2	1	...
May	,,	...	...	...	...	...	2	4	15	2	...	...	...	...
June	,,	...	...	...	1	2	7	13	...	...	...	...	...	...
July	,,	...	...	...	...	7	11	6	...	...	...	...	...	...
August	,,	...	...	...	...	5	12	7	...	...	...	...	...	...
September	,,	...	...	...	...	6	6	7	4	...	...	...	...	...
October	,,	...	...	...	...	4	9	8	5	...	...	...	...	...
November	,,	...	...	...	...	5	5	7	6	1	...	...	...	...
December	,,	...	...	...	...	...	7	6	7	...	...	...	...	...
January	,,	...	...	...	...	1	4	6	9	1	...	...	...	...
February	,,	...	...	...	...	1	6	5	7	2	...	...	...	...
March	,,	...	...	...	...	1	...	...	...	...	...	...	...	1
April	36 B.O.	...	...	...	...	...	...	...	2	2	1	1	...	...
May	,,	...	...	...	...	...	9	9	3	...	...	...	...	...
June	,,	...	...	...	...	4	13	3	...	...	...	...	...	...
July	,,	...	...	...	...	7	10	1	...	...	...	...	...	...
August	,,	...	...	...	3	11	5	2	...	...	...	...	...	...
September	,,	...	...	1	...	5	13	2	...	...	...	...	...	...
October	,,	...	...	...	...	2	12	9	3	...	...	...	...	...
November	,,	...	...	...	...	...	...	13	7	4	...	...	...	...
December	,,	...	...	...	...	1	2	2	4	2	...	1	...	...
January	,,	...	...	...	...	...	4	11	3	...	1	...	...	...
February	,,	...	...	...	...	1	3	14	5	...	...	...	...	...
March	,,	...	...	...	...	1	4	12	3	2	...	...	...	...
April	70 B.O.	...	...	...	...	...	...	...	5	5	4	2	...	...
May	,,	...	...	...	...	...	...	6	7	2	...	...	...	...
June	,,	...	...	...	1	2	5	1	2	1	...	...	...	...
July	,,	...	...	4	2	11	6	...	...	...	...	...	...	...
August	,,	...	...	...	4	12	7	...	...	...	...	...	...	...
September	,,	...	...	4	2	10	5	3	...	...	...	...	...	...
October	,,	...	...	1	1	3	6	13	3	...	...	...	...	...
November	,,	...	...	1	...	2	7	8	4	1	1	...	...	...
December	,,	...	...	...	...	...	3	6	6	7	1	...	...	...
January	,,	...	...	...	...	1	...	8	3	10	4	...	...	...
February	,,	...	...	...	...	2	3	8	9	1	...	...	...	...
March	,,	...	...	1	2	1	6	10	3	...	...	...	...	...

VARIATION IN WEIGHT OF EGGS, ETC.—FIRST TEST—*continued.*

Month.	Bird No.	Ounces to 1 dozen eggs.												
		30.	29.	28.	27.	26.	25.	24.	23.	22.	21.	20.	19.	18.
April	74 B.O.	...	...	...	...	...	...	...	...	...	1	2	6	1
May	,,	...	...	...	...		mo	ult.		...	...	...	...	...
June	,,	...	...	...	1	...	6	7	3	3	...	...	...	...
July	,,	...	...	...	...	...	1	7	8	1	...	...	...	...
August	,,	...	...	...	...	...	8	14	3	...	...	...	...	...
September	,,	...	...	...	...	...	2	13	12	1	...	...	...	...
October	,,	...	...	...	...	...	1	5	15	7	1	...	...	...
November	,,	...	...	...	...	...	1	1	8	11	4	1	...	...
December	,,	...	...	...	...	...	...	2	3	15	4	...	...	...
January	,,	...	...	...	...	...	...	1	10	12	5	...	...	...
February	,,	...	...	...	...	...	...	...	13	2	...	...	...	...
March	,,	...	...	...	...	1	7	6	2	1	...	...	...	...

2ND TEST.—FROM 10TH APRIL, 1928, TO 10TH FEBRUARY, 1929.

(Concludes 17th March, 1929).

Month.	Bird No.	Ounces to 1 dozen eggs.												
		30.	29.	28.	27.	26.	25.	24.	23.	22.	21.	20.	19.	18.
April	9 W.L.	...	...	...	...	...	...	...	6	2	2	1	...	...
May	,,	...	...	...	...	...	6	10	4	...	...	...	...	...
June	,,	...	...	...	...	4	7	4	3	...	...	...	...	...
July	,,	...	...	...	...	5	7	9	2	...	...	...	...	...
August	,,	...	...	...	...	1	13	8	1	...	...	...	...	...
September	,,	...	...	...	...	1	6	11	5	...	...	...	...	...
October	,,	...	...	...	...	1	5	10	6	1	...	...	...	...
November	,,	...	...	...	...	...	2	9	6	3	1	...	...	...
December	,,	...	...	...	...	...	1	1	1	10	8	...	...	...
January	,,	...	...	...	...	...	...	1	4	11	5	...	...	...
February	,,	...	...	...	...	...	...	1	1	3	2	1	...	...
April	18 W.L.	...	...	...	...	...	...	...	...	...	...	...	...	...
May	,,	...	...	...	...	...	...	2	4	2	1	1	...	...
June	,,	...	...	...	...	...	...	2	2	...	...	...	1	
July	,,	...	...	...	2	7	4	4	2	...	...	...	...	...
August	,,	...	...	...	5	9	8	2	...	...	...	...	...	...
September	,,	...	...	...	1	4	7	14	...	...	...	...	...	...
October	,,	...	...	1	...	3	3	7	9	1	...	...	...	...
November	,,	...	...	...	...	1	3	7	11	2	...	...	...	...
December	,,	...	...	...	...	1	2	9	10	3	...	...	...	...
January	,,	...	...	...	...	2	6	7	8	1	...	...	...	...
February	,,	...	...	...	...	1	2	5	1	...	...	...	...	...
April	26 W.L.	...	...	...	...	...	...	...	4	3	...	...	...	...
May	,,	...	...	...	...	...	1	3	3	...	1	...	...	...
June	,,	...	...	...	1	4	5	2	1	...	...	...	...	...
July	,,	...	...	...	2	9	4	3	...	...	...	...	...	...
August	,,	...	...	...	2	5	2	7	1	...	...	...	1	...
September	,,	...	...	1	3	5	6	3	...	...	...	...	...	...
October	,,	...	...	...	...	4	3	7	5	3	...	...	...	...
November	,,	...	...	...	...	...	7	4	4	...	1	...	...	...
December	,,	...	...	...	...	2	5	5	2	2		1		...
January	,,	...	...	...	...	4	4	4	1	3	...	...	...	...
February	,,	...	...	...	...	3	1	...	...	...	...	...	...	...
April	46 W.L.	...	...	...	...	...	...	...	2	3	1	1	...	...
May	,,	...	...	...	...	1	...	6	9	5	...	...	...	...
June	,,	...	...	...	...	2	5	9	5	1	...	...	...	...
July	,,	1	...	1	3	4	6	6	...	...	...	...	...	...
August	,,	...	...	...	2	6	8	6	1	...	...	...	...	...
September	,,	1	...	...	1	4	3	10	5	...	1	...	...	...
October	,,	...	...	...	...	1	4	10	7	4	...	...	...	...
November	,,	1	...	...	...	...	4	10	6	6	1	...	...	...
December	,,	...	...	...	...	...	1	3	10	10	...	...	...	...
January	,,	...	...	...	...	...	...	8	11	4	2	...	...	...
February	,,	...	...	...	...	...	...	3	1	3	2	...	...	...

VARIATION IN WEIGHT OF EGGS, ETC.—SECOND TEST—*continued.*

Month.	Bird No.	Ounces to 1 dozen eggs.											
		30.	29.	28.	27.	26.	25.	24.	23.	22.	21.	20.	19.	18.
April	57 B.O.	...	...	..	..	..	1	...	...	1	..	..	..	..
May	,,	...	...	..	..	6	8	3	1	2	...	..	..	..
June	,,	...	...	...	1	6	8	2	...	...	...	...	...	...
July	,,	..	...	2	1	10	3	1	...	...	..	...	..	...
August	,,	...	..	3	3	13	3	...	...	...	..	..	..	..
September	,,	...	1	1	4	9	7	1	..	..	..	..	..	...
October	,,	..	..	1	3	3	10	6	1	...	...	..	..	...
November	,,	...	..	1	2	9	7	3	1	...	..	..	..	..
December	,,	..	..	2	..	4	9	8	1	..	..	..	..	...
January	,,	..	..	1	..	4	9	10	1	...	..	...	..	...
February	,,	...	...	...	1	2	..	5	...	..	..	...	..	...
April	64 B.O.	...	...	...	...	...	1	1	..	2	..	1	1	..
May	,,	..	..	..	..	..	..	9	12	1	...	..	..	..
June	,,	..	..	..	..	..	..	..	2	1	...	..	..	..
July	,,	...	...	...	...	1	2	8	6	...	2	...	...	...
August	,,	..	..	..	..	1	3	8	...	..	..	..	..	..
September	,,	...	...	1	...	...	9	10	2	...	...	...	...	..
October	,,	..	..	..	1	1	4	9	7	1	1	..	..	..
November	,,	...	...	...	...	...	4	5	8	2	1	...	...	...
December	,,	...	...	...	...	...	...	7	10	2	3	...	...	..
January	,,	...	...	...	...	...	...	...	4	5	...	...	..	..
February	,,	..	..	..	..	..	..	1	3	1	..	2	..	..
April	79 B.O.	...	...	...	...	...	...	...	...	2	2	1	1	...
May	,,	...	...	...	...	...	2	7	2	1	..	..	..	..
June	,,	..	..	..	..	..	5	6	3	...	..	..	..	..
July	,,	..	1	..	..	2	4	2	..	1	..	..	..	..
August	,,	...	...	3	1	10	8	1	..	..	..	..	..	..
September	,,	...	1	...	...	5	11	8	1	..	..	..	..	..
October	,,	..	..	..	..	..	2	11	8	1	..	..	..	..
November	,,	...	...	...	1	..	...	6	9	5	1	...	..	..
December	,,	..	..	..	..	..	4	9	6	2	2	..	..	..
January	,,	...	...	...	...	1	3	7	7	1	1	..	..	..
February	,,	..	..	..	..	..	...	3	2	1	..	..	..	..
April	89 B.O.	...	...	...	...	...	...	6	1	2	2	1	1	1
May	,,	...	...	...	...	..	1	13	5	3	..	..	..	..
June	,,	..	..	..	..	2	11	9	..	..	..	..	..	..
July	,,	...	...	..	..	8	11	4	..	..	..	..	..	..
August	,,	...	...	...	...	11	10	3	..	..	..	..	..	..
September	,,	...	..	..	..	..	9	8	1	..	..	..	..	..
October	,,	...	...	...	...	...	2	19	3	..	..	..	..	..
November	,,	...	...	...	...	...	4	17	4	..	..	..	..	..
December	,,	...	...	...	...	1	1	14	9	..	..	..	..	..
January	,,	...	...	...	...	...	...	6	10	7	1	..	..	..
February	,,	..	..	..	..	..	1	3	4	1	..	..	..	..

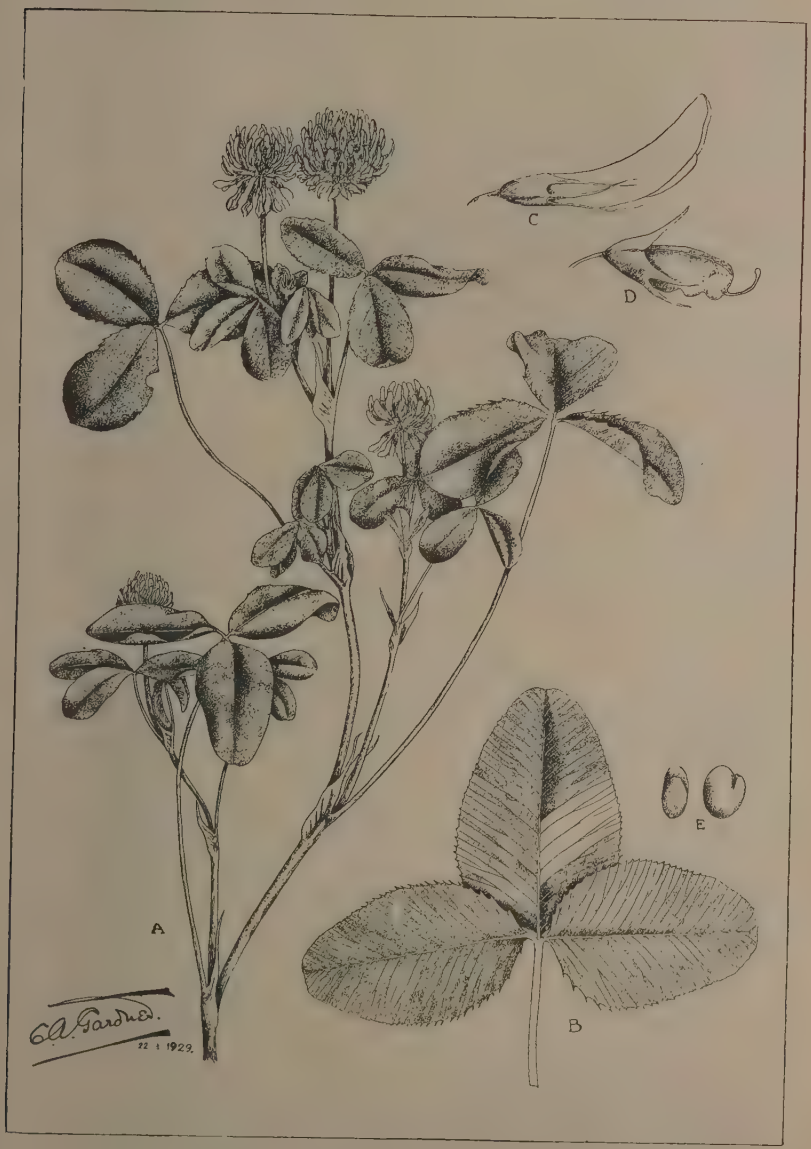
ALSIKE CLOVER.

(*Trifolium hybridum*, Linn.)

C. A. GARDNER,
Government Botanist.

This clover is indigenous to the whole of Europe excepting Britain and the extreme north, and extends to Algeria, the Caucasus and Siberia. In its wild state it inhabits damp meadows and pastures and uncultivated land, also the banks of streams. It received its common name from the village of Syke, near Upsala, in Sweden, where it is common, and has been cultivated with considerable success for well over a century. Linnaeus, in

naming the clover, regarded it as a hybrid between Red and White Clover. It is, however, specifically distinct, but in habit is intermediate between these clovers, having flowers much like those of white clover, but otherwise closely resembling Red Clover.



Alsike Clover (*Trifolium hybridum*, Linn.).

As its natural habitat indicates, Alsike Clover favours damp situations. The plant is almost insensible to cold. Its main requirement, however, is a moist soil. It cannot be expected to thrive on dry soils, or even on soils which are dry or hot during a part of the summer, except as an annual. Although it will as a rule grow where White Clover thrives, it is much more restricted on account of its moisture requirements. There are soils too dry for Alsike which are suitable for White Clover. Alsike Clover requires soil which is constantly damp. It prefers heavy soils, stiff clay or loam, especially those rich in lime, and as the rooting system is superficial an impermeable subsoil is not a disadvantage. For undrained wet clay soils, it is the most suitable of our naturalised clovers, except Strawberry Clover, which, however, does not yield the same bulk of feed.

I am indebted for the following notes on the local behaviour of Alsike Clover to Mr. P. G. Hampshire, Superintendent of Dairying:—

The clover makes excellent hay of high nutritive value. Since it is most nutritive when in flower, this is the best time for cutting.

In the lower South-West of this State, Alsike Clover can be grown successfully, either sown in a mixture or planted alone. Excellent stands have been grown in the Manjimup-Pemberton, the Denmark and Margaret River districts, thriving in rich soils with ample rain. It will not successfully withstand spring and summer weather which is hot and dry, unless the soil is moist. Under ideal conditions, compared with White Clover, it grows higher and gives heavier yields.

It is recommended for sowing in a mixture containing Rye and Cocksfoot, at the rate of one to two pounds per acre for permanent pasture in the districts, and under the conditions referred to. In such a mixture it grows tall and provides heavy growth. When sown alone eight pounds per acre is advised. The land should be well prepared, and the seeds planted in April.

Description of Plant.

Perennial, stems ascending, hollow, glabrous, not rooting at the nodes and usually branded. Leaves on long petioles, leaflets elliptical-ovate, toothed, obtuse, stipules green, finely pointed. Peduncles all axillary, longer than the leaves. Flowering heads spherical, consisting of many flowers. Pedicels much longer than the calyx, reflected after flowering. Calyx glabrous, tube short, 10-ribbed, teeth linear-lanceolate, almost equal. Corolla three to four times the length of the calyx, at first white, later rose-coloured. Ovary with two to three ovules. When the fruit is developed the corolla is brown and membranous, and the standard folded longitudinally. The fruit is a flat pod longer than the calyx, and containing one to three seeds. The seeds are small and slightly flattened, yellowish-green to dark olive green, often speckled and provided with a conspicuous projection (the radicle).

The seed is obtainable locally; an average of 707,000 seeds make up one pound in weight.

Explanation of Plate.

A.—Habit.
B.—Leaf, natural size.
C.—Flower, enlarged.
D.—Pod, enlarged.
E.—Seeds, enlarged.

FIELD EXPERIMENTS WITH WHEAT AT PINGRUP.

A. S. WILD, B.Sc. (Agric.),
Agricultural Adviser.

Two experiments with wheat were conducted on the property of Messrs. Solly Bros., Pingrup. They were—

1. A variety trial.
2. A rate of superphosphate experiment.

The land on which the experiments were conducted was typical lake country. Originally carrying Blackbutt and Boree timber, the soil was a medium loam and typical of much of the forest country of the district.

During the month of July, 1927, the land had been ploughed with a mouldboard plough to a depth of four inches. At the end of September it was skim ploughed about two inches deep. Immediately prior to seeding, the land was cultivated with a springtyne implement and harrowed.

The monthly rainfalls as officially recorded at Pingrup during 1928 are shown hereunder:—

—	Jan.	Feb.	Mar.	Apl.	Useful Rains.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
Pingrup...	105	...	9	150	223	119	373	186	139	59	1,099	9	38	1,410

The early part of May was unusually dry, but towards the end of that month heavy rains were experienced. Unfortunately, the serviceable rains terminated abruptly about the middle of September, October being particularly dry.

VARIETY TRIAL WITH WHEAT.

The object of this experiment is to compare the relative yields from four different varieties. Thus the two early-maturing varieties, "Gluyas Early" and "Merredin," are compared, one against the other, as well as against two later maturing varieties, "Nabawa" and "Yandilla King." The "Nabawa" (mid-season maturing) and the "Yandilla King" (late maturing) are also, in their turn, compared with each other. All plots, each half an acre in area, were planted in duplicate at the rate of 45 lbs. of graded seed per acre, with an application of 22 per cent. superphosphate at the rate of 112 lbs. per acre.

The later maturing varieties were planted on the 5th and the early maturing varieties on the 15th of May.

All varieties made good growth during the winter and early spring months, the "Nabawa" and "Yandilla King" stooling remarkably well. However, the advantage gained by these two varieties appeared to be lost when, with the rains terminating in September, much growth still remained to be completed, and the appearance of tipped heads, particularly in the "Yandilla King," was very disquieting. Well-prepared fallow and the ability of both "Nabawa" and "Yandilla King" to finish well in spite of seasonal setbacks saved the situation.

The results obtained are set out in the table hereunder:—

EXPERIMENTS AT PINGRUP—WHEAT VARIETY TRIAL.

GRAIN YIELDS.

Rate of seed—45lbs. per acre. Rate of super—112lbs. per acre. Late varieties planted 5th May. Early varieties planted 15th May.

	Computed Yield per Acre.		Average Yield per Acre.
	Section 1.	Section 2.	
	bus. lbs.	bus. lbs.	bus. lbs.
Yandilla King	32 58	33 28	33 13
Nabawa	32 29	30 26	31 27
Gluyas Early	24 19	22 11	23 15
Merredin	20 31	20 49	20 40

When it is known that a considerable portion of the yield of the standard early variety "Gluyas Early" was lost through lodging, the above results bear out the opinion that "Yandilla King," "Nabawa" and "Gluyas Early" are suitable varieties, able to withstand periods of scanty rainfalls.

The yields from all varieties are satisfactory. In seasons of normally consistent rainfall the variety "Merredin" would probably compare more favourably with the others. Although the results are for one year only, the fact that both "Yandilla King" and "Nabawa" have done so well, under adverse conditions, establishes the suitability of both these varieties for the Pingrup district.

RATE OF SUPERPHOSPHATE EXPERIMENT.

This experiment was conducted on land of a somewhat lighter nature than that on which the variety trial was planted. The standard late variety, "Yandilla King," was planted on the 5th May, at the rate of 45 lbs. per acre. Respective plots, each half an acre in area and planted in duplicate, were treated with applications of 75, 150 and 225 lbs. of 22 per cent. superphosphate per acre.

The results obtained are as hereunder:—

EXPERIMENTS AT PINGRUP—RATE OF SUPERPHOSPHATE EXPERIMENT.

GRAIN YIELDS.

Variety—Yandilla King. Rate of seed—45lbs. per acre. Planted 5th May.

Rate of Superphosphate per Acre.	Computed Yield per Acre.		Average Yield per Acre.
	Section 1.	Section 2.	
	bus. lbs.	bus. lbs.	bus. lbs.
150 lbs.	25 41	29 38	27 44
75 lbs.	22 37	29 5	25 51
225 lbs.	28 0	*	28 0

*Results not taken owing to interference of salt patch.

These results confirm the results of similar trials carried out at the Experiment Farms, the conclusion being that, although it is advantageous and economical to increase the application of superphosphate up to 150 lbs. per acre, no economic advantage is gained by a further increase. However, the results obtained from the plots treated with the higher rates of superphosphates do refute the erroneous idea that excessive quantities of superphosphate "burn off" the crop.

FIELD EXPERIMENTS WITH WHEAT.

SALMON GUMS EXPERIMENT FARM.

I. THOMAS, Superintendent of Wheat Farms.
L. G. SENIOR, Farm Manager.

The total rain recorded during 1928 was 792 points, this being 501 points below the average for the past 10 years. 579 points of rain fell during the growing period, May to October, inclusive. The average for the same period for the past 10 years is 836 points.

The following table shows the monthly rainfall for 1928, together with the average as officially recorded at Salmon Gums, one mile distant from the farm:—

Year.	Jan.	Feb.	Mch.	Apl.	Growing Period.							Nov.	Dec.	Total for Year.
					May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1928 ...	60	6	65	72	60	50	145	140	91	93	579	...	10	792
Average 10 years ...	22	43	118	117	157	144	137	136	126	136	836	70	82	1,293

The rainfalls during the growing periods, May-October, for each of the past ten years, 1919-28, are set out hereunder, together with the corresponding annual rainfalls:—

——	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.
May-October	726	955	1,203	1,030	845	832	750	725	744	579
January-December	1,584	1,298	1,546	1,427	1,413	1,181	1,433	1,263	1,165	792

It will be noticed that whilst the rainfall during the month of July and August for the year under review was slightly above the average, the other months of the growing period were considerably below it, and the total, viz., 579 points, for the whole period, is the lowest officially recorded.

Sufficient rain fell during May to germinate the seed, and in June, although the crops were not showing signs of distress, anxiety was felt concerning the prospects of the season. However, normal rains were experienced during the next two months, at the end of which time the prospects were most promising.

Unfortunately the conditions did not continue, as both the September and October rainfalls were considerably below normal. Not only was it below the average and the individual registrations light, but heavy drying winds were experienced in addition, which served to reduce the usefulness of the already sub-normal registrations.

Despite these adverse conditions during the critical period, the wheat crops on the farm did not appear to be affected to any extent, but throughout the growing period maintained a healthy appearance.

The soil on which the crops were grown was representative of the different types in the district, viz., light mallee, black mallee, silver bark, tea-tree and gimlet mallee.

The land was cleared of timber by rolling in October, 1926, and was burnt in February, 1927.

TIME OF SEEDING EXPERIMENT.

The land on which this experiment was conducted was cleared in 1926, and ploughed with a ten-disc cultivator plough in July, 1927. It was harrowed in October, cultivated with a springtyne cultivator in January, and again prior to seeding.

The results obtained are given below:—

SALMON GUMS EXPERIMENT FARM.

Time of Seeding Experiment.

Variety—"Gluyas Early." Seed per acre—45lbs. Superphosphate per acre—90lbs. (22 per cent.)

Time of Seeding.	Computed Yield per Acre.										Average Yield, 1928.		Percentage Yield, 1928.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
June	12	32	13	12	13	52	13	52	15	12	13	44	80
May	16	32	17	4	17	12	17	4	17	20	17	4	100
July	10	8	10	32	11	36	12	8	11	28	11	12	66

Variety—"Nabawa." Seed—45lbs. per Acre. Superphosphate—(22%) 90lbs. per acre.

Time of Seeding.	Computed Yields per Acre.										Average Yield, 1928.		Percentage Yield, 1928.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
April	15	20	15	52	17	44	16	16	15	44	16	8	125
May	12	48	11	4	13	12	13	52	13	28	12	56	100
June	7	28	6	48	6	56	6	48	8	8	7	12	55

The above results being for one year only, no definite conclusions can be arrived at, but it is quite obvious from these results that the time of planting the seed of the different varieties is a most important factor, the importance of which is not generally realised by many of the settlers in the district where this farm is located.

RATE OF SEEDING EXPERIMENT.

The object of this experiment is to ascertain the most economical rate at which to sow the seed wheat.

For the purpose of the experiment two varieties of wheat having different dates of maturity were used. Yandilla King represented the late and free stooling varieties, and S.H.J. the early and sparse stooling varieties.

The land for these trials was prepared by being ploughed in July with a ten-disc cultivating plough, and harrowed in October. It was cultivated with a springtyne cultivator in January, and again prior to seeding. A good seed bed was obtained.

The results obtained are set out below:—

SALMON GUMS EXPERIMENT FARM.

Rate of Seeding Experiment.

Variety—"Yandilla King." Planted—24th April, 1928. Superphosphate—90lbs. per acre.

Rate of Seed per acre.	Computed Yields per Acre.					Average Yield, 1928.	Percentage Yield, 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	
30lbs.	19 36	17 12	14 56	16 32	13 36	16 24	104
45lbs.	17 4	16 56	15 52	14 40	14 8	15 44	100
60lbs.	17 20	16 40	15 52	15 20	16 48	16 24	104

Variety—"S.H.J." Planted —18th May, 1928. Superphosphate—(22%) 90lbs. per acre.

Rate of Seed per acre.	Computed Yields per Acre.					Average Yield, 1928.	Percentage Yield 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	
30lbs.	13 12	14 16	15 12	12 16	11 36	13 20	100
45lbs.	16 56	14 16	13 52	13 20	8 24	13 20	100
60lbs.	14 32	14 16	12 56	13 20	12 24	13 28	101

These results indicate that it is no advantage to plant heavy rates of seed with either types of wheat.

TIME OF APPLICATION OF SUPERPHOSPHATE.

The object of this experiment, which was commenced this season, is to determine whether, when applying heavy dressings of superphosphate, it would be economical to apply part or all of the fertiliser when cultivating during the later summer or early autumn months.

The land was cleared, ploughed in July, harrowed in October, cultivated in January, again in March, and again cultivated in May prior to seeding.

The times of applying the superphosphate and the results for the season are given below:—

SALMON GUMS EXPERIMENT FARM.

Time of application of Superphosphate Experiment.

Variety—"Nabawa." Planted—11th May, 1928. Seed—45lbs. per acre.

Time of Application of Superphosphate.	Computed Yield per Acre.					Average Yield, 1928.	Percentage Yield, 1928.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	
150lbs. super. in March. 75lbs. at seeding	19 28	20 32	16 32	19 4	17 52	18 40	105
225lbs. super. in March. Nil at seeding	19 44	19 36	16 48	16 24	16 16	17 44	100
75lbs. super. in March. 150lbs. at seeding	21 12	20 8	18 56	18 32	19 28	19 36	110

The results for this year are in favour of those plots which received the heaviest dressings of superphosphate at seeding time. They are also in accord with the results obtained from similar experiments carried out at the other experiment farms, which indicate that the wheat yields are decreased when portion of the fertiliser is not applied at seeding time.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

The object of this experiment is to ascertain the amount of superphosphate per acre which can be applied most profitably.

The land on which the experiment was planted originally carried mainly Silver Bark and Mallee timber.

It was ploughed in July, 1927, and harrowed in October. It was cultivated with a springtyne implement in January, and again prior to seeding in May. An excellent seed bed was obtained, and a good germination resulted.

The results are tabulated as under:—

SALMON GUMS EXPERIMENT FARM.

Rate of Application of Superphosphate Experiment.

Variety—"Nabawa" Planted—12th May, 1928. Seed—45lbs. per acre.

Rate of Superphosphate per Acre.	Computed Yields per acre.										Average Yield, 1928.		Percentage Yield, 1928.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
150lbs.	18	48	20	24	20	16	20	24	19	20	19	52	119
75lbs.	16	48	17	28	16	40	16	24	16	0	16	40	100
225lbs.	21	28	20	40	20	40	19	12	19	28	20	16	122

These results, which are for one year only, indicate that superphosphate in excess of 75 lbs. per acre may be applied profitably, but no economic advantage is gained by increasing the rate to over 150 lbs. per acre.

SEASONAL PLANTING EXPERIMENTS.

To meet the requirements of this experiment, three sections were needed, viz.:—

(a) Section I.: Planted in April, representing early planting.
(b) Section II.: Planted in May, representing midseason planting.
(c) Section III.: Planted in June, representing late planting.

Each section, planted in its respective month, was repeated five times, all plots being eventually harvested for grain.

The objects of the experiments are:—

1. To ascertain the most suitable month to plant the late, midseason and early maturing varieties of wheat.

2. To determine the most prolific of each of the above types.

The land for this experiment was ploughed 4in. deep with a disc cultivitating plough in July, 1927, and left until the following October, when it was harrowed after rain. In January it was springtyne cultivated. In March it was lightly cultivated with the same implement and again prior to seeding.

The tabulated results for the three sections of the experiment are given below:—

SALMON GUMS EXPERIMENT FARM.

Seasonal Planting Experiment.

Seed—45lbs. per acre. Planting—April. Superphosphate (22%)—90lbs. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yield, 1928.		Percentage Yield, 1928.
		Sec. 1.		Sec 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
Yandilla King ...	Late ...	16	0	17	4	18	40	16	16	15	36	16	40	88
Nabawa Control ...	Mid-season	19	4	18	32	20	8	18	32	18	16	18	56	100
Gallipoli	Late mid-season	18	56	19	36	20	0	18	56	20	16	19	36	104
Baroota Wonder Early	Mid-season	13	20	18	24	18	0	19	36	19	4	17	44	97
Nabawa Control ...	Mid-season	17	44	17	20	19	4	19	12	18	56	18	24	100
Gresley	Early ...	14	16	15	36	15	52	14	56	16	3	15	20	83
Canberra	Early ...	16	8	15	36	16	40	15	52	17	12	16	16	90
Nabawa Control ...	Mid-season	18	43	17	20	17	36	18	56	17	28	18	0	100
Gluyas Early ...	Early ...	14	32	13	4	13	20	14	32	14	32	14	0	78

May Planting.

Seed—45lbs. per acre. Superphosphate—90lbs. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yield, 1928.		Percentage Yield, 1928.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
Yandilla King ...	Late ...	13	4	12	48	12	16	16	48	15	12	14	1	88
Nabawa (Control) ...	Mid-season	13	12	14	24	14	56	18	56	18	0	15	54	100
Gallipoli	Late mid-season	12	56	14	8	14	48	16	40	16	0	14	54	94
Baroota Wonder Early	Mid-season	11	4	10	56	12	16	13	44	11	52	11	58	72
Nabawa (Control) ...	Mid-season	14	48	14	8	16	32	19	52	17	52	16	38	100
Gresley	Early ...	12	24	12	16	14	24	14	56	13	36	13	49	83
Canberra	Early ...	12	48	13	4	16	24	19	52	18	24	16	6	98
Nabawa (Control) ...	Mid-season	14	24	14	16	17	4	19	12	16	56	16	22	100
Gluyas Early ...	Early ...	14	16	13	36	15	36	16	48	17	12	15	29	94
Carrabin	Early ...	13	52	10	56	16	0	17	12	16	16	14	51	92
Nabawa (Control) ...	Mid-season	15	20	13	4	16	0	19	12	17	4	16	8	100
S.H.J.	Early ...	14	48	13	12	15	12	17	20	15	20	15	14	94
Geeralying	Very Early	13	36	12	16	14	16	15	4	13	44	15	47	99
Nabawa (Control) ...	Mid-season	16	24	14	8	15	20	18	0	16	16	16	1	100
Noongaar	Very early	19	4	15	28	16	40	15	28	16	40	16	40	104

June Planting.

Seed—45lbs. per acre. Superphosphate—90lbs. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yields, 1928.		Percentage Yields, 1928.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
Noongaar	Very early	11	52	15	36	14	56	13	36	11	44	13	32	108
Nabawa (Control) ...	Mid-season	10	40	13	12	14	24	13	36	10	40	12	30	100
Geeralying	Very early	11	20	14	0	13	20	14	24	10	32	12	43	102
S.H.J.	Early ...	10	56	10	8	9	52	11	20	7	44	10	0	80
Nabawa (Control) ...	Mid-season	12	16	13	20	12	48	13	12	11	4	12	32	100
Merredin	Early ...	12	0	14	0	13	28	14	24	11	36	13	5	104
Gluyas Early ...	Early ...	12	32	13	52	14	24	14	16	11	36	13	20	107
Nabawa (Control) ...	Mid-season	10	48	13	52	12	48	13	44	10	48	12	24	100
Canberra	Early ...	12	16	14	32	13	20	14	0	12	16	13	17	107
Gresley	Early ...	8	32	10	40	9	52	12	24	11	52	10	40	84
Nabawa (Control) ...	Mid-season	11	44	14	0	12	32	14	24	11	4	12	45	100
Carrabin	Early ...	10	24	13	4	10	56	14	24	12	40	12	18	97

It will be noticed that the yields obtained from the midseason varieties planted in April showed to advantage. In the May planting this advantage

was not maintained to the same extent, the yields of the majority of the early varieties being only slightly lower, whilst the very early maturing variety, "Noongaar," was slightly better.

In the June planting, however, all except three of the early and very early maturing varieties gave better yields than did the control (midseason) variety, "Nabawa."

It will also be noticed that the yields obtained from the April and May plantings were considerably better than those obtained from the plots planted in June. However, as the above results are for one year only, it is not wise to draw definite conclusions.

WONGAN HILLS LIGHT LANDS FARM.

FIELD EXPERIMENTS WITH WHEAT AND OATS.

I. THOMAS,
Superintendent of Wheat Farms.

A. R. VENTON,
Farm Manager.

The rainfall during the past season has again been much below the average, the total amount recorded during the growing period, May-October, was 8.50 inches as against an average of 11.67 inches during the same period for sixteen years. The total for the year was 10.76 inches, the average for sixteen years being 15.21 inches. Fortunately it was fairly well distributed, and this, coupled with good seed bed and a liberal dressing of superphosphate resulted in the good yields being obtained.

	Jan.	Feb.	Mar.	Growing Period.								Nov.	Dec.	Total for Year.
				April	May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1927 ...	...	7	301	34	143	221	260	89	57	50	820	5	11	11·78
1928 ...	76	...	28	79	124	109	319	169	96	35	850	5	36	10·76
Previous 15 years average	47	51	101	67	195	300	272	198	133	92	1.190	38	50	15·44

It is expected that the yields obtained would have been increased had not the October rains (35 pts.) been so much below the average (92 pts.). This appeared to affect the oats rather more than the wheat, many of the heads formed being only partly filled.

TIME OF SEEDING EXPERIMENT.

This experiment is being conducted to determine the most suitable month for planting the wheat crop in this district

The varieties Gluyas Early and Nabawa were used, the former being planted in May, June and July, and the latter in April, May and June. The land was ploughed during 1927 to a depth of 4 inches with a Sunderent

and was cross ploughed with the same implement in September and October. During March it was lightly disced and the Nabawa Section was then springtyned prior to the April planting. The May and June plots were again cultivated with the same implement before being seeded.

The Gluyas Early section was harrowed before the May plots were planted, and the June and July plots were both cultivated with the Springtyne before being planted.

The tabulated results are given below:—

WONGAN HILLS LIGHT LAND FARM.

Time of Seeding Experiment.

Variety—Nabawa. Seed—40lbs. per acre. Superphosphate—150lbs. (22%) per acre.

Planted.	Computed Yields per acre.					Average Yield, 1928.	Percentage Yield, 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
April	22 24	21 36	21 52	20 56	20 16	21 28	100
May	22 16	22 32	20 40	20 0	21 12	21 20	100
June	9 26	10 0	7 52	9 12	7 52	8 56	42

Variety—Gluyas Early. Seed—45lbs. per acre. Superphosphate—150lbs. (22%) per acre.

Planted.	Computed Yields per acre.					Average Yield, 1928.	Percentage Yield, 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
June	11 44	11 36	11 28	11 12	10 32	11 20	49
May	23 20	23 28	23 28	22 40	22 48	23 12	100
July	10 56	10 40	10 24	10 16	...	10 32	45

Although the results are for one year only, and no definite conclusion can be arrived at, they agree with the results of similar experiments carried out at the other Experiment Farms, viz., that seeding operations should be completed by the end of May. This is the practice which is generally adopted and can be continued with confidence. The results emphasise the importance of planting the seed at the correct time.

RATE OF SEEDING EXPERIMENT—WHEAT.

As is the case at the other experiment farms, this experiment is conducted with two varieties, one representing the free stooling and the other the sparse stooling types respectively.

The land on which the trials at this farm were conducted is of the tussocky type of sand plain. It was ploughed with a disc implement (Sundercut) 4 inches deep in June and July, 1927, and cross skim-ploughed with the same implement during the following September and October. A light disc cultivation was given in March, after which it was scrub-raked. Harrows preceded the drill.

The tabulated results of both varieties for the past season and those for 1925-28 are given below:—

WONGAN HILLS LIGHT LANDS FARM.

Rate of Seeding Experiment—Wheat.

Grain Yields.

Variety—Nabawa. Superphosphate—150lbs. (22%) per acre. Planted—16th May, 1928.

Rate of Seed per acre.	Computed Yields per acre.										Avearge Yields per acre, 1928.	Percentage Yields, 1928.	Average Yields per acre, 1925-28.	Average percentage Yields, 1925-28.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus. lbs.	%	bus. lbs.	%
60	25	36	24	16	22	48	23	4	23	12	23 47	102	18 56	101
45	24	24	23	4	23	12	23	4	23	4	23 22	100	18 48	100
90	24	16	23	36	24	32	24	8	24	24	24 11	103	18 40	99

Variety—S.H.J.

Rate of Seed per acre.	Computed Yields per acre.										Average Yields per acre, 1928.	Percentage Yields, 1928.	Average Yields per acre, 1925-28.	Average percentage Yields, 1925-28.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus. lbs.	%	bus. lbs.	%
60	*		25	20	25	52	26	8	*		25 47	106	16 0	103
45	24	24	25	4	23	44	24	8	23	44	24 13	100	15 36	100
90	24	48	26	16	25	20	25	36	24	8	25 14	104	16 16	104

*** Lost owing to an accident during harvesting.**

The results for this year with both varieties show that the yields are slightly increased when the heavier rates of seed are sown.

The average results, however, indicate that with a free stooling variety, no advantage is gained by planting more than 45lbs. per acre.

The average results of the sparse stooling variety confirm the results obtained this year, viz., that the yields are increased when a heavier rate than 45 lbs. is used, but there is no advantage by increasing that rate to more than 60 lbs. per acre.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

This experiment was commenced this year with the object of determining whether, when heavy dressings of super. are used, it would be profitable to apply part or all of the fertiliser when cultivating the fallowed land during late summer or early autumn, so that seeding operations can be expedited.

The land on which the experiment was conducted was tussocky sand plain. It was ploughed 4in. deep with a Sundercut in June and July the previous year, cross ploughed with the same implement in September and October, and lightly disced in March.

The soil was in good condition at seeding time. Germination was good though somewhat uneven on those plots receiving no superphosphate at the time of seeding. These latter plots continued to be backward throughout the growing period, but the difference was not so noticeable. They were, however, uneven in appearance and less dense.

The results for this season are given as under:—

WONGAN HILLS LIGHT LANDS FARM.

Time of Application of Superphosphate Experiment.

Seed—45lbs. per acre. Planted—11th May, 1928.

Time of application of Super.	Computed Yields per acre.					Average Yields, 1928.	Percentage Yields, 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
75lbs in March... 150lbs. at seeding	30 56	27 44	28 0	31 20	31 4	29 49	115
225lbs. in March ...	26 32	25 4	25 52	26 32	26 8	26 1	100
150lbs in March. ... 75lbs. at seeding	27 36	28 24	32 16	26 40	24 24	27 52	107

These results are in favour of the plots which receive the heaviest dressings at planting.

They are also in accord with those obtained from a similar experiment carried out at the other Experiment Farms which indicate that the wheat yields are decreased when portion of the fertiliser is not applied at seeding time.

RATE OF SUPERPHOSPHATE EXPERIMENT.

This experiment has been conducted for the past three years for the purpose of determining the most profitable amounts of superphosphate to apply on this type of country. Three rates of application were used, viz., 75 lbs. per acre, 150 lbs. per acre, and 225 lbs. per acre.

The land was of tussocky type of sand plain on a low-lying flat. It was ploughed with a Sundercut to a depth of four inches during the winter of 1927. It was cross-disced with the same implement during October, and lightly disced in the following March. It was harrowed in front of the drill.

Germination was good, no striking difference being noted between the plots at this stage. As the season advanced, however, the difference between the control plot and the plots receiving the heavier dressings became very marked. The latter stooled better, made better growth and altogether presented a more even and attractive appearance.

The tabulated results are given below:—

WONGAN HILLS LIGHT LANDS FARM.

Rate of Superphosphate Experiment.

Variety—Nabawa. Planted—12th May, 1928. Seed—45lbs. per acre.

Rate of Superphosphate.	Computed Yield per acre.					Average Yields, 1928. Sections 1—4.	Percentage Yields, 1928. Sections 1—4.	Average Yields, 1925–28.	Percentage Yields, 1925–28.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	bus. lbs.	%
150	27 28	26 16	26 8	25 44	26 16	26 24	172	19 54	140
75	16 24	15 12	15 4	14 40	*	15 20	100	14 14	100
225	30 32	30 56	31 20	29 12	31 4	30 30	199	20 2	141

* Lost owing to an accident when harvesting.

The results again show that on this class of soil, dressings of superphosphate considerably in excess of 75 lbs. per acre can be applied with advantage.

MIXED FERTILISER EXPERIMENT.

The object of this experiment is to determine whether any advantage is derived by supplementing the dressing of superphosphate with a potassic manure for growing a wheat crop on light land.

Three fertilisers were used and were applied as follows:—

Plot 1. 150 lbs. Superphosphate + 56 lbs. Muriate of Potash per acre.

Plot 2. 150 lbs. Superphosphate per acre (Control).

Plot 3. 150 lbs. Superphosphate + 140 lbs. Kainite per acre.

This section of plots, each 1/8 of an acre, was repeated five times. The quantity of potash stated as K_2O is the same in 56 lbs. of the Muriate as in 140 lbs. of the Kainite.

The land was a tussocky type of sand plain which was ploughed with a Sundercut in June and July and cross ploughed with the same implement during September and October. It was disced lightly in March and harrowed prior to planting.

The potassic fertilisers were applied to the respective plots about three weeks before seeding. This course is considered advisable owing to the risk of injuring the young plants incurred by applying a fertiliser of this type at seeding time.

At no time during the growing period could any difference between the different plots be noticed

The results obtained this year together with the average results of the past two years are as under:—

WONGAN HILLS LIGHT LANDS FARM.

Mixed Fertiliser Experiment.

Variety—Nabawa. Planted—12th May. Seed—45lbs. per acre.

Fertiliser applied per acre.	Computed Yields per acre.					Average Yields, 1928.	Percentage 1928. Yields,	Average Yields, 1927–28.	Percentage Yields, 1927–28.
	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.				
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs	bus. lbs.	%	bus. lbs.	
Superphosphate 150lbs. Muriate of Potash 56lbs.	27 12	27 28	27 52	24 48	27 28	26 58	98	19 42	99
Superphosphate 150lbs.	28 0	27 44	26 32	26 56	28 16	27 30	100	19 52	100
Superphosphate 150lbs. Kainite 140lbs. ...	29 4	27 52	25 20	26 56	27 12	27 17	99	19 50	100

The results of this year and also the average results for the past two years show that the yields are not increased by applying a potassic fertiliser to this class of soil.

SEASONAL PLANTING EXPERIMENT.

To meet the requirements of this experiment, three sections were needed, viz.:—

a. Section I. planted in April representing Early Planting.
b. Section II. planted in May representing Midseason Planting.
c. Section III. planted in June representing Late Planting.

Each section planted in its respective month was repeated five times, all plots being eventually harvested for grain.

The objects of the experiment are:—

1. To ascertain the most suitable month to plant the Late, Midseason and Early maturing varieties of wheat.

2. To determine the most prolific of each of the above types:—

For the previous year's experiment, the control plots of all three sections were planted in the one month, viz., May.

This did not prove satisfactory and it was decided to plant all the plots (including the controls) of each section at the same time. With this exception the arrangement of the experiment was similar to that of the previous year.

The land was ploughed with a disc plough (sundercut) in June and July, 1927, and again lightly in September. The growth of suckers again necessitated a disc cultivation in March, and a springtyne cultivator preceded the drill.

The results of the three sections of this experiment are set out in the following tables:—

WONGAN HILLS LIGHT LANDS FARM.

SEASONAL PLANTING EXPERIMENT.

April Planting.

Planted—17th April, 1928. Seed—45lbs. per acre. Superphosphate—150lbs. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yields per acre, 1928.		Percentage Yield per acre, 1928.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
Yandilla King ...	Late ...	25	52	22	16	22	8	20	56	18	48	22	0	113
Nabawa (Control)	Mid-season	20	24	20	48	18	48	19	28	18	16	19	33	100
Baroota Wonder	Mid-season	22	32	19	20	22	32	18	16	16	40	19	52	102
Early Nabawa (Control)	Mid-season	21	52	*		18	8	19	20	19	28	19	42	100
Gallipoli	Late mid-season	22	56	20	8	18	32	19	52	19	28	20	11	102
Gluyas Early ...	Early ...	18	24	15	12	16	56	15	4	16	16	16	22	84
Nabawa (Control)	Mid-season	21	52	19	44	19	36	17	28	18	56	19	31	100
Canberra	Early ...	18	48	17	4	16	0	16	24	16	16	16	54	87

* Lost owing to an accident when harvesting.

WONGAN HILLS LIGHT LANDS FARM—*continued.*

SEASONAL PLANTING EXPERIMENT—*continued.*

May Planting.

Planted—14th and 15th May, 1928. Seed—45lbs. per acre. Superphosphate—150lbs. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yields per acre, 1928.		Percentage Yield per acre, 1928.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
Yandilla King ...	Late ...	16	48	16	48	20	8	20	24	19	20	18	42	95
Nabawa (Control)	Mid-season	17	12	18	56	*		21	12	21	4	19	36	100
Baroota Wonder Early	Mid-season	16	32	18	48	20	0	18	0	*		18	20	94
Gallipoli	Late mid-season	19	20	20	40	21	4	20	16	22	24	20	45	107
Nabawa (Control)	Mid-season	18	16	19	4	18	32	19	36	21	52	19	28	100
Gresley	Early ...	17	36	19	4	18	16	19	12	22	0	19	14	98
Canberra	Early ...	19	36	19	12	17	44	21	52	24	16	20	32	107
Nabawa (Control)	Mid-season	16	16	16	40	19	20	20	24	23	28	19	14	100
Carrabin	Early ...	15	44	19	12	19	20	16	40	21	20	18	27	96
Comeback ...	Early ...	13	52	17	44	17	44	17	4	19	44	17	14	81
Nabawa (Control)	Mid-season	17	4	22	16	21	4	21	44	24	24	21	18	100
Joffre	Mid-season	18	8	23	28	22	0	23	28	24	32	22	19	105
S.H.J.	Early ...	15	44	17	12	15	28	16	16	19	44	16	53	83
Nabawa (Control)	Mid-season	18	32	19	52	18	8	20	40	25	4	20	27	100
Noongaar	Very early	12	8	12	8	12	40	14	8	16	8	13	26	66

* Lost owing to an accident during harvesting.

June Planting.

Planted—20th June, 1928. Seed—45lbs. per acre. Superphosphate—150lbs. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yields per acre, 1928.		Percentage Yield per acre, 1928.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus	lbs.	bus.	lbs.	
Nabawa (Control)	Mid-season	13	28	13	28	14	16	12	24	13	12	13	22	100
Carrabin	Early ...	12	0	11	28	13	28	11	28	10	24	11	46	88
Gluyas Early ...	Early ...	12	8	12	48	14	16	12	32	13	4	12	58	93
Nabawa (Control)	Mid-season	13	44	13	12	13	28	14	40	14	24	13	54	100
Canberra	Early ...	13	4	13	20	12	40	12	24	12	48	12	51	92
Joffre	Mid-season	13	36	14	24	13	4	12	24	13	36	13	25	98
Nabawa (Control)	Mid-season	13	36	14	32	14	0	13	12	13	20	13	44	100
Gresley	Early ...	11	52	12	16	10	0	9	44	9	44	10	43	78
S.H.J.	Early ...	12	48	11	52	11	12	10	16	12	24	11	42	82
Nabawa (Control)	Mid-season	14	0	14	24	14	56	14	0	13	52	14	14	100
Noongaar	Very Early	13	12	13	4	12	0	12	0	13	44	12	48	90

The results show that good yields were obtained from all varieties when planted in April, the late variety being most prominent.

In the plots planted in May good yields were also obtained except from the early variety "Noongar." In this section the Midseason and Early varieties show to advantage.

In the section planted in June, however, the yields did not equal those obtained from the earlier plantings and although there was not a great difference in the yields from most of the plots the highest yields were obtained from the control variety "Nabawa." However as these results are for one year only they cannot be taken as conclusive.

OAT VARIETY TRIAL.

This experiment was identical with the trial carried out the previous year—seven varieties being planted, including the control variety, Burts Early.

The plots were ploughed wth a disc implement (sundercut) in June and July, 1927, and were cross ploughed with the same machine in September and October of the same year. The land was scrub-raked in March, 1928.

Prior to drilling the land was springtyne cultivated and harrowed.

The tabulated results for both hay and grain are given below:—

WONGAN HILLS LIGHT LANDS FARM.

OAT VARIETY TRIAL.

Grain Yields.

Seed—40lbs. per acre. Phosphate—150lbs. per acre.

Variety.	Maturity.	Computed Yields per acre.										Average Yield per acre, 1928.		Percentage Yields, 1928.	Average Yield per acre, 1926–28.		Average percentage Yields, 1926–28.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		bus.	lbs.	
Mulga ...	Early ...	*		†		17	0	17	8	14	8	16	5	90	13	34	92
Burts Early (Control)	Early ...	19	0	16	8	18	0	17	32	18	24	17	37	100	15	2	100
Ruakura ...	Late mid-season	20	24	19	0	19	32	17	0	16	8	18	21	103	13	10	88
Algerian ...	Late ...	29	8	29	8	25	16	22	32	25	0	26	13	129	18	11	126
Burts Early (Control)	Early ...	19	16	19	32	20	32	21	16	21	0	20	19	100	14	22	100
Glen Innes No. 7	Midseason	28	32	28	32	23	8	23	8	24	32	25	30	126	16	37	116
Guyra ...	Midseason	22	8	29	0	19	16	*		24	32	23	34	117	16	33	111
Burts Early (Control)	Early ...	18	24	19	16	22	16	22	8	19	24	20	18	100	15	8	100
Lachlan ...	Midseason	27	16	29	0	26	24	30	32	27	8	28	8	138	16	13	107

* Owing to lodging, the yield obtained was interfered with and no comparison is made.

† The result obtained was interfered with by an accident to the machine whilst harvesting. The yield obtained was not taken for comparison.

HAY RESULTS.

Variety.	Maturity.	Computed Yields per acre.									Average Yield per acre, 1928.			Percentage Yields, 1928.	Average Yields per acre, 1926–28.			Average Percentage, 1926–28.
		Sec. 1.			Sec. 2.			Sec. 3.										
		C.	Q.	L.	C.	Q.	L.	C.	Q.	L.	C.	Q.	L.		C.	Q.	L.	
Mulga	Early ...	37	0	24	34	3	4	37	0	0	36	1	9	114	28	2	24	113
Burts Early (Control)	Early ...	33	3	20	32	0	16	32	2	16	32	3	17	100	25	1	10	100
Ruakura ...	Late mid-season	26	2	0	23	2	24	27	1	12	25	3	12	78	19	1	6	76
Algerian ...	Late ...	33	2	24	30	3	12	33	2	24	32	3	1	99	23	2	10	89
Burts Early (Control)	Early ...	32	3	20	32	1	12	33	2	0	32	3	20	100	26	1	13	100
Glen Innis No. 7	Midseason	35	2	24	35	0	24	35	2	24	32	0	24	98	23	2	15	101
Guyra	Midseason	33	0	8	32	2	0	33	0	16	32	3	17	106	24	1	24	99
Burts Early (Control)	Early ...	30	0	8	33	1	12	30	0	8	31	0	19	100	24	3	8	100
Lachlan ...	Midseason	34	0	24	33	1	12	29	0	8	32	0	24	103	25	1	11	102

The results for this year and the averaged results for past years show the early midseason varieties are better for hay, while the midseason and late maturing varieties are more suitable for grain.

RATE OF SEEDING EXPERIMENT—OATS.

As was the case for the similar experiment with wheat, this was planted with a free and a sparse stooling variety, and the land also was prepared identically with that for the wheat experiment.

The results of both representative types are given below, together with average results for the past three years.

WONGAN HILLS LIGHT LANDS FARM.

RATE OF SEEDING EXPERIMENT—OATS.

Grain Yields.

Variety—Burts Early. Superphosphate—150lbs. per acre. Planted—11th May, 1928.

Rate of Seed per acre.	Computed Yields per acre.										Avearge Yields per acre, 1928.		Percentage Yields, 1928.	Average Yields per acre.		Average percentage Yields, 1926-28.
	Sec. 1.		Sec.2.		Sec. 3.		Sec. 4.		Sec. 5.							
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		bus.	lbs.	
40	23	8	21	24	20	8	21	24	21	0	21	21	102	19	26	101
30	22	16	21	24	*		21	32	18	32	21	6	100	19	21	100
60	22	0	20	24	19	16	20	24	*		20	26	98	19	29	101

Variety—Algerian.

Rate of Seed per acre.	Computed Yields per acre.										Avearge Yields per acre, 1928.		Percentage Yields, 1928.	Average Yields per acre.		Average percentage Yields, 1926-28.
	Sec. 1.		Sec.2.		Sec. 3.		Sec. 4.		Sec. 5.							
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		bus.	lbs.	
40	19	24	19	32	19	0	18	16	19	32	19	13	109	18	7	109
30	16	16	18	16	18	24	17	16	†		17	28	100	16	23	100
60	20	0	18	24	19	32	17	16	†		18	38	107	18	18	111

* Lost owing to an accident during harvesting. † Owing to a stoppage in the superphosphate these yields cannot be used for comparison.

These results confirm those of the two previous years, viz., that with a free stooling variety like Algerian, increased yields are obtained when the heavier rates of 40 lbs. and 60 lbs. of seed are sown. Of the two rates, however, the average results for the two years disclose that the rate of 40 lbs. per acre is the most economical.

The results with the sparse stooling variety, Burts Early, for this year and the averaged results for the three years the experiment has been carried out, show that there is practically no difference in the yields obtained from the different rates of seed.

It is surprising that with these two varieties the yields of the free stooling type were increased by the heavier rates of seed, whereas no advantage was gained when the heavy rates were sown with a sparse stooling variety. This is the reverse to what was experienced with a similar experiment carried out with wheat, and is contrary to what may have been expected. This may be due to the sparse stooling variety containing a greater number of seeds per bushel than the freer stooling one, which has larger and heavier grain.

FIELD EXPERIMENTS WITH WHEAT.

YILGARN EXPERIMENT FARM.

I. Thomas,
Superintendent of Wheat Farms.

G. K. Stevens,
Farm Manager.

The rainfall for the twelve months ending 31st December totalled 817 points or 224 points less than the average of 1041 points as recorded at Southern Cross for the past 35 years. During the growing period, May to October, 556 points fell, this total being 129 points below the average for the same period. Owing to the amount of timber growing around the crop, the hot winds which were experienced did not affect it to the same extent as would be expected on a more open field. The rainfall from time to time was sufficient to maintain the good healthy appearance of the crop, but a good soaking rain during September would have been beneficial and resulted in a greater yield than that actually obtained. The numerous light falls of rain during August and September appeared to benefit to a greater extent the crops growing on land which had been fallowed than those planted on unfallowed land. The yields of the latter were also affected by the rabbits during the early stages of its growth.

Below are tabulated the monthly rainfalls recorded at the farm for 1928, together with the monthly averages for the past 35 years as recorded at Southern Cross, a distance of eight miles west of the farm:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
1928 ...	92	...	62	50	170	76	165	89	48	8	556	...	57	817
Average, 35 years	47	57	86	73	143	143	146	115	76	62	685	45	48	1,041

TIME OF SEEDING EXPERIMENT.

The object of this experiment is to determine the most suitable time for planting the wheat crop.

The land was ploughed during July, 1927, to a depth of 3 inches. It received springtyne cultivations in August, September, and October. It was disced in February, cultivated with the springtyne implement during April and immediately prior to seeding.

The germination was good.

The results for this year are given below:—

YILGARN EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT.

Variety—Nabawa. Seed—38lbs. per acre. Superphosphate—75lbs. (22%) per acre.

Time of Seeding.	Computed Yields per Acre.					Average Yield, 1928.	Percentage Yield, 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
April	22 24	23 36	24 24	23 36	20 56	22 56	97
May	24 48	23 12	24 48	21 12	23 44	23 36	100
June	13 12	12 40	13 36	11 44	11 12	21 32	53

Variety—Gluyas Early. Seed—43lbs. per acre. Superphosphate—75lbs. per acre.

Planted.	Computed Yield per Acre.					Average Yields, 1928.	Percentage Yields, 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
June	17 4	14 0	14 56	15 28	12 56	14 53	65
May	23 52	22 8	21 20	22 56	23 28	22 45	100
July	7 20	8 0	7 36	7 12	5 36	7 9	31

The results here are in accord with those obtained at the other Experiment Farms, namely, that seeding operations should be completed by the end of May.

RATE OF SEEDING EXPERIMENT.

This experiment is carried out with two varieties, a Midseason free stooling variety, "Nabawa," and an early sparse stooling variety, "S.H.J.."

The land, which was heavy salmon and gimlet forest country, was ploughed to a depth of three inches in July, 1927. It was worked with the springtyne cultivator during August, September and October, and was lightly disced in February. It was again springtyne cultivated in April and also immediately prior to seeding. A firm seed bed was formed and a good germination resulted.

The following tables show the results obtained this year:—

YILGARN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT.

Variety—Nabawa. Planted—11th May, 1928. Superphosphate—75lbs. (22%) per acre.

Rate of Seeding per Acre.	Computed Yields per Acre.					Average Yield, 1928.	Percentage Yield, 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%
23 lbs.	22 48	23 4	23 12	24 16	22 24	23 12	103
45 lbs.	22 40	22 24	23 44	22 40	21 12	22 32	100
33 lbs.	21 52	20 56	23 28	22 48	21 20	22 8	98

Variety—S.H.J. Planted—15th May, 1928. Superphosphate—75lbs. (22%) per acre.

Rate of Seeding per Acre.	Computed Yields per Acre.										Average Yield, 1928.		Percentage Yield, 1928.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
23 lbs.	13	12	16	40	16	0	15	44	17	4	15	44	102
45 lbs.	15	4	15	52	14	40	15	28	16	16	15	28	100
33 lbs.	15	46	15	52	14	8	16	40	17	36	15	52	103

These results are for one year only, but they would seem to indicate so far that there is nothing to be gained by sowing heavy rates of seed.

TIME OF APPLICATION OF SUPERPHOSPHATE.

The object of this experiment is to determine whether, when heavy dressings of superphosphate are applied, it would be profitable to apply part or whole of the amount when cultivating the fallowed land during late summer or early autumn.

The land, which was heavy salmon and gimlet country, was fallowed to a depth of three inches in July, 1927, springtyne cultivated in August and again in September and October. It was disced to a depth of two inches in February and cultivated immediately prior to seeding.

The layout of the experiment and the results obtained are given below.

YILGARN EXPERIMENT FARM.

TIME OF APPLICATION OF SUPERPHOSPHATE.

Variety—Gluyas Early. Planted—May. Rate of Seed—43lbs. per acre.

Details of Application of Superphosphate.	Computed Yields per Acre.										Average Yields, 1928.		Percentage Yield, 1928.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
75lbs. in March ... 150lbs. at seeding time	28	40	28	0	26	40	26	56	23	44	26	48	107
225lbs. in March	25	4	23	52	24	56	25	28	25	28	24	58	100
150lbs. in March ... 75lbs. at seeding time	25	36	24	32	27	44	25	28	26	56	26	3	104

These results, which are for one year only, show that the wheat yields are decreased when portion of the superphosphate is not applied at seeding time.

RATE OF APPLICATION OF SUPERPHOSPHATE.

This experiment was planted on heavy salmon and gimlet country. The land was ploughed to a depth of three inches in July, 1927, cultivated with a springtyne implement in August and received further cultivation in September and October. It was disced to a depth of two inches in February and cultivated with a springtyne in April and again immediately prior to seeding.

The results obtained this year are as follow:—

YILGARN EXPERIMENT FARM.

RATE OF SUPERPHOSPHATE EXPERIMENT.

Variety—Gluyas Early. Planted—May. Seed—43lbs. per acre.

Rate of Superphos. per Acre.	Computed Yield per Acre.										Average Yield, 1928.		Percentage Yield, 1928.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
150 lbs.	25	28	26	16	26	32	24	56	20	24	24	48	115
75 lbs.	23	12	22	16	23	28	20	40	18	8	21	33	100
225 lbs.	26	16	27	52	26	0	19	28	24	32	24	50	115

The above results which are for one year only indicate that applications of superphosphate in excess of 75 lbs. and up to 150lbs. per acre may be applied with profit. They also contradict the erroneous idea, held in some quarters, that heavy rates of superphosphate applied to new land cause the crops to "burn off."

SEASONAL PLANTING EXPERIMENT.

To meet the requirements of this experiment three sections were needed viz.:—

(a) Section I.—Planted in April, representing Early Planting.
(b) „ II.—Planted in May, representing Midseason Planting.
(c) „ III.—Planted in June representing Late Planting.

Each section, planted in its respective month, was repeated five times, all plots being eventually harvested for grain.

The objects of the experiment are:—

1. To ascertain the most suitable month to plant the Late, Midseason and Early maturing varieties of wheat.

2. To determine the most prolific of each of the above types.

The plots for this experiment were ploughed with a disc implement (sundercut) 3-4 inches deep.

The land was then springtyne cultivated in August, September and October. These workings were followed by a disc cultivation in February and another springtyne cultivation in April. This machine also preceded the drill.

The following tables show the results of the three sections of the experiment:—

YILGARN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT, 1928.

APRIL PLANTING.

Seed—45lbs. per acre. Planted—April 15th, 1928. Superphosphate—75lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yield 1928.		Percentage Yield 1928.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Gresley	Early ...	20	0	17	52	21	20	18	32	17	52	19	7	80
Nabawa	Midseason	26	0	21	4	24	48	24	48	22	8	23	46	100
Canberra	Early ...	23	28	23	36	26	8	23	4	23	4	23	32	100
Gluyas Early ...	Early ...	23	4	22	24	22	48	22	8	21	52	22	27	93
Nabawa ...	Midseason	24	40	24	56	25	20	24	24	22	0	24	16	100
Merredin	Early ...	23	12	24	8	24	8	22	56	20	32	22	59	95
Geeralying ...	Very Early	22	48	23	12	21	4	22	32	20	48	22	5	90
Nabawa	Midseason	25	28	25	44	24	8	24	56	22	16	24	30	100
Noongaar	Very Early	19	52	20	48	19	20	20	24	20	56	20	16	83

MAY PLANTING.

Seed - 45lbs. per acre. Planted—May 15th, 1928. Superphosphate—75lbs. per acre.

Variety.	Maturity.	Computed Yield per Acre.										Average Yield, 1928.		Percentage Yield, 1928.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Gresley	Early ...	15	52	18	8	16	32	15	44	15	44	16	24	74
Nabawa	Midseason	20	24	24	0	22	32	20	24	24	8	22	18	100
Canberra	Early ...	21	44	25	4	23	12	22	8	22	48	22	59	103
Gluyas Early ...	Early ...	20	40	22	32	22	56	21	20	21	12	21	44	104
Nabawa	Midseason	21	28	22	0	21	52	18	24	20	48	20	54	100
Merredin	Early ...	19	36	19	44	20	24	18	56	20	40	19	52	95
Comeback ...	Early ...	15	44	15	20	15	20	13	44	14	8	14	51	72
Nabawa	Midseason	21	28	21	28	20	32	19	28	20	40	20	43	100
Carrabin	Early ...	19	52	21	20	21	20	19	52	19	44	20	26	99
Geeralying ...	Very Early	17	20	21	44	22	24	19	20	18	8	19	47	105
Nabawa	Midseason	19	36	22	8	19	52	17	12	15	44	18	54	100
Noongaar	Very Early	20	32	21	28	19	52	19	44	15	4	19	20	102
S.H.J.	Early ...	16	40	16	0	16	48	16	16	13	20	15	48	80
Nabawa ...	Midseason	21	28	20	32	20	32	20	48	15	4	19	41	100

JUNE PLANTING.

Planted—14th June, 1928. Seed —45lbs. per acre. Superphosphate (22%)—75lbs. per acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yields, 1928.		Percentage Yields, 1928.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5. *				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Gresley	Early ...	8	26	9	3	9	55	8	51	...		8	3	100
Nabawa (Control)	Midseason	6	17	8	41	8	41	9	14	..		8	31	100
Canberra	Early ...	9	46	12	53	14	37	12	11	...		12	21	147
Gluyas Early ...	Early ...	10	16	15	29	15	18	14	17	...		13	55	133
Nabawa (Control)	Midseason	6	37	9	14	12	0	13	34	...		10	25	100
Merredin	Early ...	8	42	13	45	14	6	11	40	...		12	0	115
Geeralying ...	Very Early	12	1	13	55	14	26	14	37	...		13	44	123
Nabawa (Control)	Midseason	7	49	10	4	13	45	12	53	...		12	6	100
Noongaar	Very Early	13	3	15	39	14	26	16	10	...		14	58	134
S.H.J.	Early ...	9	21	11	39	9	44	8	41	...		9	33	104
Nabawa (Control)	Midseason	9	3	8	10	11	7	8	41	...		9	12	100

* Owing to an accident at the time of planting the yields from this section were interfered with, and are not suitable for comparison.

Most of the Early and Very Early varieties, when planted in June, yielded better than did the control midseason variety, "Nabawa," when planted in that month.

However, as the results are for one year only, definite conclusions cannot be arrived at.

Although some of the Early varieties did not yield so well, most of them when planted in May compared favourably with the control midseason variety.

FIELD EXPERIMENTS WITH WHEAT AND OATS.

MERREDIN EXPERIMENT FARM.

I. THOMAS, Superintendent of Wheat Farms.
J. H. LANGFIELD, Farm Manager.

The total rainfall for the year was 873 points, and the average for the past 17 years is 1,185 points. This is the lowest annual rainfall since 1914, and the only other year on record in which the total has not exceeded 10 inches.

The rainfall during the growing period was 651 points (May to October, inclusive).

The rainfall during April, May and the early part of June was very light, and caused considerable anxiety on account of the slow and faulty germination; during July and August the rainfall was good and the crops made splendid growth, but little or no rain fell after the 2nd September, and consequently the promising growth was not maintained. Owing to the light winter rainfall there was no reserve in the soil, and early in September the crops showed the effects of the dry weather, and as only 19 points fell during October they had no opportunity of justifying their early promise.

The monthly rainfall recorded at the farm for 1928, together with the average for 17 years, is as follows:—

Year.	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total, May to Oct.	Nov.	Dec.	Yearly Total
					May.	June.	July.	Aug.	Sept.	Oct.				
1928 ...	39	...	101	58	76	107	224	154	71	19	651	...	24	873
Average, 17 yrs.	56	50	113	76	124	174	186	135	97	80	796	36	59	1,186

TIME OF SEEDING EXPERIMENT.

This experiment has been conducted for the past six years in order to determine the most suitable time for seeding the wheat crop.

The land on which the experiment was conducted this year was ploughed to a depth of four inches in July, cultivated with a springtyne implement in September, harrowed after rain during the first week in April, and lightly disc cultivated the following week, with a final cultivation with a springtyne implement prior to planting.

The results for this year, together with the average results for the past six years, are hereunder:—

MERREDIN EXPERIMENT FARM.

TIME OF PLANTING EXPERIMENT.

Variety—Gluyas Early. Seed...45lbs. per Acre. Superphosphate—120lbs. per Acre.

Planted.	Computed Yields per Acre.										Average Yields, 1928.		Percentage Yields, 1928.	Average Yields, 1923–1928.		Percentage Yields, 1923–1928.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
June 18th ...	18	40	18	56	19	4	19	4	18	40	18	52	93	22	44	86
May 17th ...	20	0	20	48	19	52	20	40	20	24	20	20	100	26	23	100
July 16th ...	11	44	12	24	12	32	12	48	14	56	12	52	63	13	46	52

TIME OF PLANTING EXPERIMENT.

Table showing analysis of Average Yields, 1923–28.

Year.	Yields.		
	Planted May.	Planted June.	Planted July.
	bus. lbs.	bus. lbs.	bus. lbs.
1923	24 13	27 33	15 47
1924	30 56	28 0	20 8
1925	17 20	16 40	10 24
1926	23 4	18 16	11 20
1927	32 27	27 5	12 7
1928	20 20	18 52	12 52
Average, 1923–28 ...	26 23	22 44	13 46
Percentage Yields ...	100%	86%	52%

There is only one conclusion that can be arrived at from the above results of the experiment, and that is that seeding should be completed during the month of May. This is the practice generally adopted, and can be continued with every confidence.

RATE OF SEEDING EXPERIMENT.

As in previous years this experiment was carried out with the two varieties, "Nabawa" and "Florence," representing the free and sparse stooling varieties respectively.

The land was ploughed in June, 1927, and springtyne cultivated in September. It was harrowed after rain at the end of March, and disc cultivated in April. It was then cultivated with a springtyne implement prior to seeding.

The results obtained this year, together with the average results of past years, are as under:—

MERREDIN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT.

Variety—Nabawa. **Planted—1st May, 1928.** **Superphosphate—120lbs. per Acre.**

Rate of Seed per Acre.	Computed Yields per Acre.					Average Yield, 1928.	Percentage Yield, 1928.	Average Percentage Yield, 1915–28.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.			
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%
30 lbs.	9 20	9 36	9 44	10 0	11 20	10 0	97	95
45 lbs....	9 36	10 40	8 56	10 24	12 0	10 16	100	100
60 lbs.	9 52	10 24	10 16	10 48	11 44	10 32	103	100

From the results obtained at this farm in this and previous years, it is apparent that it is unnecessary to sow either the sparse or free stooling varieties at a higher rate than 45 lbs. of graded seed per acre.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

This experiment was commenced during the past season with the object of determining whether, when heavy dressings of superphosphate are used, it would be economical to apply part or all of the fertiliser when cultivating the fallowed land during the late summer or early autumn to enable seeding operations to be expedited.

To suit the requirements three plots were required. Each section was repeated five times.

The land for this experiment was ploughed in June, 1927, to a depth of four inches, and cultivated with a springtyne implement in September. When the superphosphate was applied on 21st March no rain of any consequence had fallen since the 15th of December. The soil which was very dry was lightly cultivated, first with a springtyne implement. The plots were harrowed after 84 points of rain at the end of March.

The results obtained are shown hereunder:—

MERREDIN EXPERIMENT FARM.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

Variety– Gluyas Early. Planted May 14th, 1928. Seed –45lbs. per Acre.

Time of Application.	Computed Yield per Acre.										Average Yields, 1928.		Percentage Yields. 1928.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
75lbs. in March ; 150lbs. at seeding	20	48	20	32	20	16	20	8	20	40	20	28	104
225lbs. in March	21	20	20	16	18	56	19	12	18	32	19	39	100
150lbs. in March ; 75lbs. at seeding	22	24	20	48	20	56	20	24	19	28	20	48	106

As the results of this experiment are for one year only, no definite conclusions can as yet be drawn, but the indications are that the yields are decreased when portion of the fertiliser is not applied at seeding time.

RATE OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

The land for this experiment was fallowed during the winter of 1927, and springtyne cultivated in September. It was harrowed after rain at the end of March, disc cultivated in April, and again springtyned before planting.

The results obtained this year, together with the average results for the past six years, are tabulated below:—

MERREDIN EXPERIMENT FARM.

Rate of Superphosphate Experiment.

Variety—Gluyas Early. Planted 12th May, 1928. Seed—45lbs. per acre.

Rate of Superphosphate.	Computed Yield per acre.										Average Yields, 1928.		Percentage Yields. 1928.	Average Yields, 1923–28.		Percentage Yields. 1923–28.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
150	19	44	20	40	Plot	lost	20	40	19	44	20	12	110	24	5	110
75	19	4	17	20	18	0	19	12	18	24	18	24	100	21	56	100
225	21	36	19	28	21	20	20	24	20	56	20	44	113	25	25	116

The results again show that the wheat yields are increased when dressings of superphosphate greater than 75 lbs. per acre are applied.

NITROGEN EXPERIMENT.

This experiment is conducted for the purpose of ascertaining whether—

(1) A small quantity of nitrogenous fertiliser, 25 lbs. of sulphate of ammonia, applied at planting time has a beneficial effect upon the yields of wheat crops; and

(2) Whether the same quantity of nitrogenous fertiliser will lessen the need for fallowing.

For the purpose of this trial five plots were required, of which three were fallowed in June, 1927, and the other two were left unfallowed. The fallowed plots were ploughed with a heavy disc implement four inches deep, and were cultivated in September. They were harrowed in March after rain.

The unfallowed plots were ploughed early in April, after 24 points of rain which fell at the end of March.

All plots were disc cultivated before planting.

The tables below give the results for the year, together with the averages from the commencement of the experiment (four years). A percentage comparison between the fallowed and unfallowed plots is also given.

MERREDIN EXPERIMENT FARM.

NITROGEN EXPERIMENT.

Variety—Nabawa. Planted 12th May, 1928. Superphosphate—120lbs. per Acre.

Treatment.	Fallow.						Non-Fallow.				
	Computed Yields per Acre.			Average, 1928.	Percentage Yields, 1928.	Percentage Yields, 1925–28.	Computed Yields per Acre.		Average Yields, 1928.	Percentage Yields, age 1928.	Percentage Yields, age 1925–28.
	Section 1.	Section 2.	Section 3.				Section 1.	Section 2.			
	bus. lbs.	bus. lbs.	bus. lbs.	b. lbs.	%	%	bus. lbs.	bus. lbs.	b. lbs.	%	%
120lbs. Super ...	18 56	15 44	17 12	17 20	100	100	9 4	6 56	8 0	100	100
120lbs. Super plus 25lbs. Sulphate of Ammonia	18 56	15 44	19 20	18 0	104	99	8 8	6 24	6 40	83	92

COMPARISON OF FALLOWED AND UNFALLOWED LAND.

—	120lbs. Super per Acre.		120lbs. Super plus 25lbs. Sulphate of Ammonia.	
	Percentage, 1928.	Percentage, 1925–28.	Percentage, 1928.	Percentage, 1925–28.
	%	%	%	%
Fallow	100	100	100	100
Non-Fallow	46	61	37	58

The results again indicate that on heavy forest land the application of a small amount of nitrogenous fertiliser at seeding time does not increase the yields. Neither does the small dressing lessen the need for fallowing, as is shown very clearly in the second table.

SEASONAL PLANTING EXPERIMENT.

To meet the requirements of this experiment three sections were needed, viz.:—

(a) Section I.—Planted in April, representing early planting.

(b) Section II.: Planted in May, representing midseason planting.

(c) Section III.: Planted in June, representing late planting.

Each section, planted in its respective month, was repeated five times, all plots being eventually harvested for grain.

The objects of the experiment are:—

1. To ascertain the most suitable month to plant the Late, Midseason and Early maturing varieties of wheat.

2. To determine the most prolific of each of the above types.

For the previous year's experiment the control plots of all three sections were planted in the one month, viz., May.

This did not prove satisfactory, and it was decided to plant all the plots including the controls of each section at the same time.

With this exception the arrangement of the experiment was similar to that of the previous year.

The land on which this experiment was conducted was ploughed with a heavy disc implement during the previous June to a depth of four inches. It was cultivated during September, and harrowed after 84 points of rain in March. During the second week of April it was cultivated with the tandem disc.

The May and June plots were both springtyne cultivated in May, and the June plot was harrowed before planting.

Germination was uneven and early growth slow. The crops were affected somewhat by the dry period in September.

Tabulated results are as under:—

MERREDIN EXPERIMENT FARM.

SEASONAL PLANTING EXPERIMENT.

APRIL PLANTING.

Planted 19th April, 1928. Seed—43lbs. per Acre. Superphosphate—120lbs. per Acre.

Varieties.	Maturity.	Computed Yields per Acre.										Average Yield, 1928.		Percentage Yield, 1928.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Yandilla King ...	Late	19	36	17	4	18	16	14	0	16	8	17	4	90
Nabawa (Control)	Midseason ...	19	52	18	40	18	56	18	32	18	56	18	56	100
Joffre	Late-Midseason	20	56	18	16	19	20	18	0	19	28	19	12	101
Gallipoli ...	Late-Midseason	19	28	17	36	18	8	19	4	20	32	18	56	100
Nabawa (Control)	Midseason ...	18	48	19	4	18	8	19	4	19	28	18	56	100
Gluyas Early ...	Early. ...	16	56	16	48	15	36	18	24	16	16	16	48	89
Canberra ...	Early ...	19	44	19	52	17	4	19	52	18	0	18	56	97
Nabawa (Control)	Midseason ...	21	4	19	12	16	40	19	28	20	16	19	20	100
Carrabin ...	Early ...	17	36	16	0	13	28	15	20	17	4	15	52	82

MAY PLANTING.

Planted 17th May, 1928. Seed—43lbs. per Acre. Superphosphate—120lbs. per Acre.

Varieties.	Maturity.	Computed Yields per Acre.										Average Yield, 1928.		Percentage Yield, 1928.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Yandilla King	Late ...	15	12	7	44	6	8	6	16	8	24	8	48	59
Nabawa (Control)	Midseason ...	20	0	15	20	12	8	12	16	14	40	14	56	100
Joffre	Late-Midseason	20	40	16	0	14	48	12	56	14	40	15	52	106
Gallipoli ...	Late-Midseason	19	12	8	48	11	20	10	32	12	8	12	56	81
Nabawa (Control)	Midseason ...	21	44	14	8	15	4	14	0	14	48	16	0	100
Comeback ...	Early ...	15	12	10	8	11	4	11	20	10	24	11	36	72
Carrabin ...	Early ...	17	44	13	28	13	4	13	12	12	0	13	52	90
Nabawa (Control)	Midseason ...	19	28	15	52	14	40	15	4	14	32	15	28	100
Gresley ...	Early ...	18	16	12	40	13	44	14	16	12	56	14	24	93
Merredin ...	Early ...	21	20	15	44	16	40	16	40	16	40	17	28	115
Nabawa (Control)	Midseason ...	18	48	13	4	13	44	15	20	14	48	15	12	100
Canberra ...	Early ...	22	32	17	52	16	8	19	12	16	40	18	32	122
Gluyas Early ...	Early ...	19	36	16	0	15	4	17	12	15	20	16	40	110
Nabawa ...	Midseason ...	19	20	14	24	12	32	15	36	14	16	15	12	100
S.H.J. ...	Early ...	17	52	12	32	11	36	14	0	11	12	13	28	88
Geeralying ...	Very Early ...	20	40	14	56	13	44	17	12	13	44	16	0	109
Nabawa (Control)	Midseason ...	20	0	14	0	11	28	15	28	12	8	14	40	106
Noongaar ...	Very Early ...	18	8	15	28	11	36	15	20	12	32	14	40	100

JUNE PLANTING.

Planted—15th June, 1928. Seed—43lbs. per Acre. Super—120lbs. per Acre.

Varieties.	Maturity.	Computed Yields per Acre.										Average Yield, 1928.		Percentage Yield, 1928.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Carrabin ...	Early ...	12	40	...		10	32	12	24	12	0	11	52	91
Nabawa (Control)	Midseason ...	13	20	14	24	11	12	13	28	12	56	13	4	100
Gluyas Early ...	Early ...	16	8	15	44	13	28	15	36	15	20	15	12	116
Canberra ...	Early ...	16	0	15	36	14	56	14	24	15	20	15	12	115
Nabawa (Control)	Midseason ...	14	48	13	44	12	40	11	52	12	48	13	12	100
Merredin ...	Early ...	15	20	12	40	13	36	13	44	14	0	13	52	105
Gresley ...	Early ...	11	12	9	52	9	52	10	48	10	32	10	24	79
Nabawa (Control)	Midseason ...	14	40	11	52	12	8	13	36	13	20	13	4	100
S.H.J. ...	Early ...	13	28	10	8	11	44	10	24	11	12	11	20	87
Noongaar ...	Very Early ...	15	36	12	32	15	28	14	16	14	56	14	32	113
Nabawa (Control)	Midseason ...	13	52	11	52	13	4	12	32	12	48	12	48	100
Geeralying ...	Very Early ...	13	44	12	8	13	52	13	52	13	28	13	28	105

It will be noticed that the yields obtained from most of the varieties planted in both May and June show to advantage. As the above results are for one year only, it would be unwise to attempt the deduction of definite conclusions, particularly with an experiment of this nature where more than one important factor is liable to influence the yields.

Until the experiment has been conducted sufficiently long enough for definite conclusions to be arrived at, it is well to be guided by past experience, which has shown that in normal years it is inadvisable to plant early varieties in April.

OAT VARIETY TRIAL.

This experiment has been conducted for the past six years. Four varieties were used with "Burts Early" as the control.

The land, which was typical Gimlet and Salmon Gum country, was ploughed in June, 1927, to a depth of four inches, cultivated with a spring-

tyne cultivator in September, and harrowed after 84 points of rain on the 29th March. It was disc cultivated early in April, springtyned again before planting, and harrowed after drilling.

The results obtained this year, together with the percentage averages for previous years, are given below:—

MERREDIN EXPERIMENT FARM.

OAT VARIETY TRIAL.

GRAIN YIELDS.

Seed—40lbs. per Acre. Superphosphate (22%)—120lbs. per Acre.

Variety.	Computed Yields per Acre.										Average Yields, 1928.		Percentage Yields, 1928.	Average Yields, 1923-28.		Percentage Yields, 1923-28.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
Burt's Early ...	32	24	29	16	30	8	28	24	24	24	29	3	100	27	14	100
Glen Innes No. 7	30	8	28	32	29	8	27	0	29	24	28	38	100	27	25	101
Algerian ...	11	16	8	8	11	8	10	0	13	8	10	32	37	25	25	94
Guyra ...	30	8	27	32	28	24	28	32	26	0	28	11	96	29	28	105
Mulga ...	34	0	31	32	32	16	33	32	29	16	32	11	110	34	8	121
Burt's Early ...	30	8	28	32	31	16	33	24	22	24	29	13	100	28	9	100

The results this season further confirm the conclusion already drawn that, for districts with a rainfall similar to that of Merredin, the Early and Midseason varieties are the most suitable for both hay and grain.

FIELD EXPERIMENTS WITH WHEAT.

CHAPMAN EXPERIMENT FARM.

I. Thomas, Superintendent of Wheat Farms.
P. Jeffrey, Farm Manager.

The land on which the experiments were conducted originally carried Jam with a little York Gum timber, and had been cleared some years previously.

The following table shows the monthly rainfall recorded at the farm during the year, together with the averages for the past 23 years:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total.	Nov.	Dec.	Total for year.
					May.	June.	July.	Aug.	Sept.	Oct.				
1928 ...	56	...	40	35	315	262	603	243	139	85	1,647	4	7	1,789
Average, 23 years	27	50	69	43	227	432	394	264	172	97	1,586	26	29	1,830

These records show the total rainfall for the year to be 41 points below, and that for the growing period to be 61 points above, the average.

Light rains fell in March and April, and were followed by a dry spell from 29th April to the 20th of May, which caused some considerable anxiety. During the last ten days of May, however, over 300 points were registered. This was excessive, and caused the land to become waterlogged, which was not to the advantage of the crops already sown, and in addition cultural operations were delayed for some considerable time.

All the experiments were planted on fallowed land. This was ploughed during the winter months of 1927, after which it was worked with either a springtyne or a disc cultivator to destroy weeds and assist in the formation of a soil mulch. It was again cultivated after the rains in March and April, and prior to seeding time few weeds were in evidence. Shortly after the completion of seeding operations, however, there was a vigorous weed growth in nearly all the paddocks.

This was due to the early rains not being sufficiently heavy to germinate all the weed seeds, and so allow of their destruction by cultivation prior to seeding.

TIME OF SEEDING EXPERIMENT.

This experiment was commenced in 1923 and has been planted each year since, but, owing to the plots being destroyed by fire in 1924 and other factors interfering, the results were not obtained in 1925 and 1926.

Until this year the experiment has been confined to the early variety, "Gluyas Early," planted in May, June and July. This year the midseason variety, "Nabawa," was included, planted in April, May and June.

The land was ploughed with a four-furrow mouldboard plough in July, 1927, and was springtyne cultivated in October, 1927, and again in March, 1928. The whole was again springtyne cultivated prior to seeding.

The May and June sections in the "Nabawa" portion of the experiment, and the June and July sections in the "Gluyas Early" portion, all received additional cultivations immediately prior to seeding.

The April and May plantings were sown on a dry seed bed, but the later sowings were in moist ground.

The following tables show the results obtained:—

CHAPMAN EXPERIMENT FARM.

TIME OF SEEDING EXPERIMENT.

Variety—"Gluyas Early." Seed—45lbs. per acre. Superphosphate (22%)—112lbs. per acre.

Planted.	Computed Yield per Acre.										Average yield per Acre, 1928.		Percentage Yield, 1928.	Average Yield, 1923 and 1927-28.		Average Percentage Yield, 1923 & 1927 28.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.							
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
May	15	20	15	20	15	4	15	36	15	44	15	28	100	18	8	100
June	12	16	12	48	13	4	12	48	12	56	12	48	83	14	48	82
July	8	16	6	40	9	20	6	24	5	52	7	20	48	10	24	57

Variety—"Nabawa." Seed—45lbs. per acre. Superphosphate (22%) 112lbs. per acre.

Planted.	Computed Yield per Acre.										Average Yield per acre, 1928.		Percentage Yield 1928.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
April	11	28	13	28	13	28	12	24	13	4	12	48	99
May	12	40	12	40	13	20	13	4	12	56	12	56	100
June	11	44	11	44	9	28	10	32	9	44	10	40	83

From these results it can be definitely concluded that when an early variety is planted the yields are considerably reduced when the planting is delayed until June. They also indicate that it is an advantage to commence seeding operations in April so that they may be completed by the end of May.

RATE OF SEEDING EXPERIMENT.

As in previous years this experiment was carried out with two varieties, viz., "Yandilla King," a late free-stooling variety, and "S.H.J.," an early, sparse-stooling variety.

The land on which this experiment was planted was fallowed in September, 1927, and cultivated with a springtyne implement in October, 1927. It was cultivated in April, 1928, and again in May prior to seeding.

The seed was sown in a dry seed bed, and did not germinate until the fourth week in May. There was considerable weed growth on all the plots.

The results obtained this year, together with the averages for the past five years are as follow:—

CHAPMAN EXPERIMENT FARM.

RATE OF SEEDING EXPERIMENT.

GRAIN YIELDS.

Variety—"Yandilla King." Planted 30th April, 1928. Superphosphate (22%)—150lbs. per acre.

Rate of seed per acre.	Computed Yields per Acre.										Average Yields per Acre, 1928.		Percentage Yield, 1928.	Average Yield per Acre, 1923-28.		Average Percentage Yield, 1923-28.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.							
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60	16	0	17	12	18	32	17	44	15	20	16	56	109	18	32	99
45	15	4	15	4	17	20	14	24	16	0	15	36	100	18	48	100
90	17	20	16	48	18	40	15	28	16	24	16	56	109	19	12	102

HAY YIELDS.

Rate of Seed per Acre.	Computed Yields per Acre.									Average Yield per Acre, 1928.			Percentage Yields, 1928.	Average Yield per Acre, 1923-28.			Average Percentage. Yields. 1923-28.
	Section 1.			Section 2.			Section 3.										
lbs.	cwts.	qrs.	lb.	cwt.	qr.	lb.	cwt.	qr.	lb.	cwt.	qr.	lb.	%	cwt.	qr.	lb.	%
60	28	1	12	30	1	12	27	2	24	28	3	4	104	25	0	24	95
45	27	1	20	26	2	8	28	2	24	27	2	8	100	26	2	16	100
90	33	1	20	29	1	4	30	2	0	31	0	8	113	27	0	8	102

GRAIN YIELDS.

Variety—"S.H.J." Planted 7th June, 1928. Superphosphate (22%)—150lbs. per acre.

Rate of Seed per Acre.	Computed Yield per Acre.										Average Yield per Acre, 1928.		Percentage Yield, 1928.	Average Yield per Acre, 1923-28.		Average Percentage Yields. 1923-28.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.							
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	bus.	lbs.	%
60	22	48	22	24	24	24	23	44	21	20	22	56	106	17	36	107
5	22	8	23	4	22	48	21	4	19	20	21	44	100	16	32	100
90	23	44	24	56	25	12	23	52	22	16	23	44	109	18	24	111

HAY YIELDS.

Rate of Seed per Acre.	Computed Yield per Acre.			Average Yield per Acre, 1928.	Percentage Yield, 1928.	Average Yield per Acre, 1923–28.	Average Percentage Yields, 1923–28.
	Section 1.	Section 2.	Section 3.				
lbs.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	%	cwt. qr. lb.	%
60	30 3 20	32 0 24	31 1 28	31 2 0	98	28 0 8	104
45	31 3 12	31 0 16	32 2 8	32 0 24	100	27 0 0	100
90	34 3 20	34 3 4	34 0 16	34 2 16	108	28 0 8	104

These results confirm those of previous years, which indicated that with a sparse-stooling variety the yields of both hay and grain are increased when the heavier rates of seed are sown.

The results obtained this season from the free-stooling variety show that increased yields of both hay and grain were obtained from the plots with the higher rates of seeding. The average results for the past six years, however, show that little or no difference is obtained from the different rates of seeding a free-stooling variety.

TIME OF APPLICATION OF SUPERPHOSPHATE EXPERIMENT.

This experiment was commenced during the past season with the object of determining whether, when heavy dressings of superphosphate are used, it would be economical to apply part or all of the fertiliser when cultivating the fallowed land during the late summer or early autumn, thus enabling seeding operations to be expedited.

To suit the requirements of this experiment three plots were used. Each section was repeated five times.

The land which was York Gum and Jam country was fallowed during September, 1927, and springtyne cultivated in October. It was springtyne cultivated prior to the application of superphosphate in March, and again before seeding.

CHAPMAN EXPERIMENT FARM.

TIME OF APPLICATION OF SUPER EXPERIMENT.

Variety—"Nabawa." Planted 16th May, 1928. Seed—45lbs. per acre.

Time of Application.	Computed Yields.					Average Yield, 1928.	Percentage Yield, 1928.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.		
	bus. lbs.	bus. lbs.	bus. lbs.	qus. lbs.	bus. lbs.	bus. lbs.	%
75lbs. super in March; 150lbs. super at Planting	14 56	17 36	18 0	16 24	16 24	16 40	117
225lbs. super in March	13 44	15 52	13 52	13 28	14 8	14 13	100
150lbs. super in March; 75lbs. super at Planting	15 52	17 36	16 24	15 4	15 52	16 9	113

As the results of this experiment are for one year only, no definite conclusions can as yet be drawn, but the indications are that the yields are decreased when a portion of the fertiliser is not applied at seeding time.

RATE OF SUPERPHOSPHATE EXPERIMENT.

This experiment was commenced in 1923, and has been continued each year since, except in 1926, when the results were discarded.

The land was ploughed during September, 1927, with a mouldboard plough, and was springtyne cultivated during the same month. It was springtyne cultivated in March, and again prior to seeding.

Germination was delayed owing to absence of rain, and later considerable weed growth was in evidence.

The tabulated results for this year, together with the averages since 1923, are given below:—

CHAPMAN EXPERIMENT FARM.

RATE OF SUPER EXPERIMENT.

GRAIN RESULTS.

"Variety—Nabawa." Planted 16th May, 1928. Seed—45lbs. per acre.

Rate of Superphosphate per Acre.	Computed Yield per Acre.										Average Yield per Acre, 1928.		Percentage Yield, 1928.	Percentage Yield, 1923-28.*
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.					
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%	%
150	15	44	17	20	15	28	16	32	17	52	16	32	110	110
75	15	36	16	16	13	20	14	56	14	48	14	56	100	100
225	19	4	18	0	18	8	18	40	19	44	18	40	125	117

* 1926 results not taken.

HAY RESULTS.

Rate of Superphosphate per Acre.	Computed Yield per Acre.									Average Yield per Acre, 1928.			Percentage Yield, 1928.	Percentage Yield, 1923–28.*
	Section 1.			Section 2.			Section 3.							
lbs.	cwt.	qr.	lb.	cwt.	qr.	lb.	cwt.	qr.	lb.	cwt.	qr.	lb.	%	%
150	32	1	12	31	0	0	31	2	8	31	2	16	114	112
75	27	2	24	28	1	12	26	3	4	27	2	16	100	100
225	33	3	4	33	2	24	32	0	0	33	0	16	120	115

* 1926 results not taken.

As with a similar experiment at the Merredin Experiment Farm it is again demonstrated that the use of heavier dressings of superphosphate results in increased yields for both hay and grain.

NITROGEN EXPERIMENT.

The objects of this experiment are to determine—

(1) whether a small quantity of nitrogenous fertiliser, 25 lbs. per acre of sulphate of ammonia, applied at planting time has a beneficial effect upon the yields of wheat crops; and

(2) whether the same quantity of nitrogenous fertiliser will lessen the need for fallowing.

For the purpose of the trial three plots were fallowed in September, 1927, and two plots situated between these were left unfallowed. The fallowed plots were ploughed with a mouldboard plough from 4 to 4½ inches deep, cultivated with a springtyne cultivator in October, 1927, and again in April, 1928, and also prior to seeding.

The unfallowed plots were ploughed with a heavy disc plough in May, and cultivated prior to seeding.

The land upon which this experiment was conducted originally carried York Gum and Jam timber.

Sheep were run on both the fallowed and unfallowed plots in order to assist in the control of weed growth.

The tabulated results are as follow:—

CHAPMAN EXPERIMENT FARM.

NITROGEN EXPERIMENT.

Variety—"Nabawa," 45lbs. per acre. Planted 24th May, 1928. Superphosphate (22%)—112lbs. per acre.

Treatment.	Fallowed. Computed Yield per Acre. Section 1.	Fallowed. Computed Yield per Acre. Section 2.	Fallowed. Computed Yield per Acre. Section 3.	Fallowed. Average, 1928.	Fallowed. Percentage Yield. 1928.	Fallowed. Percentage Yield. 1926-28	Unfallowed. Computed Yield per Acre. Section 1.	Unfallowed. Computed Yield per Acre. Section 2.	Unfallowed. Average, 1928.	Unfallowed. Percentage Yield. 1928.	Unfallowed. Percentage Yield. 1926-28.	Percentage Comparisons. Fallowed.	Percentage Comparisons. Unfallowed.
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	%	%	bus. lbs.	bus. lbs.	bus. lbs.	%	%	%	%
112lbs. super	18 8	21 28	18 32	19 20	100	100	17 52	13 44	15 44	100	100	100	80
112lbs. super plus 25lbs. sulphate of ammonia	18 0	19 20	19 44	18 56	98	97	18 24	14 48	16 40	106	103	100	89

This experiment has been conducted for the past three years, and from the results obtained it is quite evident that no beneficial results are obtained when a small application of sulphate of ammonia is applied to the land which

has been fallowed. Whilst the results this year from the non-fallowed plots, and also the percentage yields for the three years the trials have been conducted, show that the yields were increased by the addition of a light application (25 lbs.) of the nitrogenous fertiliser, the increase was not sufficient to cover the extra cost of the application.

These results also establish the fact that a light application of a nitrogenous fertiliser does not remove the need for fallowing, but rather emphasises its importance as a limiting factor for the growth of the wheat crop.

SEASONAL PLANTING EXPERIMENT.

To meet the requirements of this experiment three sections were needed, viz.—

(a) Section I.: Planted in April, representing Early planting.

(b) Section II.: Planted in May, representing Midseason Planting.

(c) Section III.: Planted in June, representing Late Planting.

Each section, planted in its respective month, was repeated five times, all plots being eventually harvested for grain.

The objects of the experiment are:—

(1) To ascertain the most suitable month to plant the Late, Midseason and Early maturing varieties of wheat.

(2) To determine the most prolific of each of the above types.

For the previous years experiment the control plots of all three sections were planted in the one month, viz., May.

This did not prove satisfactory, and it was decided to plant all the plots (including the controls) of each section at the same time.

With this exception the arrangement of the experiment was similar to that of the previous year.

The land was ploughed with a mouldboard plough in July, 1927. It was springtyne cultivated in October, 1927, again in the following April after rain, and finally prior to seeding.

The tables of the results of the several sections are given below:—

Chapman Experiment Farm.

SEASONAL PLANTING EXPERIMENT.

April Planting.

Planted 18th April, 1928. Seed—45lbs. per Acre. Superphosphate (22%)—112lbs. per Acre.

Variety	Maturity.	Computed Yields per Acre.										Average Yield.		Percentage.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Yandilla King	Late	14	16	15	28	13	44	13	20	14	8	14	11	97
Nabawa (Control)	Midseason ,,	15	20	14	0	14	56	14	48	14	16	14	40	100
Baroota Wonder	Midseason ...	15	28	13	52	14	48	13	52	14	24	14	29	99
Early Joffre	Late-Midseason	15	44	13	4	15	52	14	48	15	4	14	54	109
Nabawa (Control)	Midseason ...	15	12	*		13	12	13	20	13	4	13	42	100
Gluyas Early ...	Early	14	0	12	56	14	56	13	28	13	4	13	41	100
Canberra ...	Early	15	52	14	48	15	36	15	44	15	20	15	28	110
Nabawa (Control)	Midseason ...	16	0	12	0	13	4	14	8	15	20	14	6	100
Gallipoli ...	Late-Midseason	15	20	14	0	14	32	14	16	14	8	14	27	102

* As the yield of this plot has evidently been interfered with it was decided to discard the result.

CHAPMAN EXPERIMENT FARM—*continued.*

SEASONAL PLANTING EXPERIMENT—*continued.*

MAY PLANTING.

Planted 22nd May, 1928. Seed—45lbs. per Acre. Superphosphate (22%)—112lbs. per Acre.

Variety.	Maturity.	Computed Yields per Acre.										Average Yield.		Percentage.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Yandilla King	Late	14	16	15	52	16	16	15	4	15	12	15	20	95
Nabawa (Control)	Midseason ...	16	16	16	56	17	4	15	4	15	44	16	13	100
Baroota Wonder	Midseason ...	15	28	15	36	15	36	13	20	14	24	14	53	92
Early														
Joffre	Late-Midseason	14	0	16	24	17	36	16	0	16	16	16	3	104
Nabawa (Control)	Midseason ...	14	16	15	52	17	4	14	56	15	20	15	29	100
Gallipoli ...	Late-Midseason	14	16	15	28	18	0	16	48	16	56	16	18	105
Gluyas Early ...	Early	13	12	14	24	15	44	15	28	13	44	14	30	89
Nabawa (Control)	Midseason ...	15	4	16	56	17	20	17	12	14	40	16	14	100
Canberra ...	Early	13	4	14	40	16	8	16	8	14	48	14	58	92
Gresley	Early	13	20	14	0	15	12	15	20	14	40	14	30	91
Nabawa (Control)	Midseason ...	14	48	15	36	17	12	16	24	15	4	15	49	100
Merredin ...	Early	16	48	15	44	18	0	17	28	15	52	16	46	106
Carrabin ...	Early	14	48	14	40	16	24	18	16	17	36	16	21	100
Nabawa (Control)	Midseason ...	14	56	16	32	17	4	17	44	15	4	16	16	100
Geeralying ...	Very Early ...	13	12	14	24	15	4	16	8	13	52	14	32	89
S. H. J. ...	Early	16	24	17	4	17	28	19	52	20	0	18	10	116
Nabawa (Control)	Midseason ...	14	56	16	24	15	52	16	0	14	32	15	21	100
Noongaar ...	Very Early ...	15	4	15	28	15	36	14	16	16	40	15	25	100

JUNE PLANTING.

Planted 18th June, 1928. Seed—45lbs. per Acre. Superphosphate (22%)—112lbs. per Acre.

Variety.	Maturity.	Computed Yield per Acre.										Average Yield.		Percentage.
		Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	%
Noongaar ...	Very Early ...	19	12	19	20	17	52	17	12	12	40	17	15	92
Nabawa (Control)	Midseason ...	19	4	20	0	20	0	18	0	16	24	18	42	100
S.H.J.	Early	16	16	17	4	18	24	15	52	14	8	16	21	87
Geeralying ...	Very Early ...	16	24	16	48	17	12	14	0	13	4	15	30	80
Nabawa (Control)	Midseason ...	20	16	19	44	21	44	18	56	15	36	19	15	100
Gluyas Early ...	Early	15	12	15	28	19	12	17	52	13	36	16	16	84
Canberra ...	Early	17	36	18	32	18	40	18	40	14	16	17	33	90
Nabawa (Control)	Midseason ...	20	24	20	0	19	52	20	16	17	12	19	33	100
Merredin ...	Early	13	44	17	4	17	36	17	20	13	4	15	46	81

These results show that the yields obtained from the varieties planted in June were slightly better than those obtained from the plots planted in May and April, and also that the plots planted in May yielded better than those planted in April.

In the section planted in April it will be noticed that, except in two instances, when a midseason and an early variety showed to advantage, the yields obtained were very even. In the section planted in May, although all varieties yielded well, the highest yield was obtained from an early variety.

In the June planted plots, however, the control (midseason variety), showed to advantage, which is contrary to expectations.

As the results are for one year only it is unwise to draw any definite conclusion but to be guided by past experience, which has shown that it is inadvisable to plant early varieties in April, and that for late planting an early or very early maturing variety is most suitable.

COPPER POWDERS FOR THE PREVENTION OF BUNT IN WHEAT.

B. L. SOUTHERN, A.A.C.I.,
Government Chemical Laboratory.

E. J. LIMBOURN,
Seedsman, Merredin Experiment Farm.

Further investigations have been conducted on Copper Carbonate dusting powders as described in this Journal.* Experiments have been made with the same samples with a view to determining the specific reasons for some powders showing marked superiority over others, thus facilitating the fixing of standards for the physical and chemical compositions of these materials.

A lot of work has been done in an endeavour to discover what factors are influencing the rate of solubility of the copper compounds in the soil solution surrounding the dusted wheat grain. The authors would appreciate any information as to the lethal dose of copper for Bunt spores (*Tilletia levis*); if a certain amount of copper in solution will accelerate the germination of the spores, or again whether the germination of the spores is retarded sufficiently long for the seedlings to withstand attack.

Very few of the copper dusts purchased in the market are basic copper carbonates, the majority being mixtures of basic carbonate and basic sulphate. Almost invariably the mixtures have given better results in the field than the commercially pure carbonates. One sample sold as carbonate proved to be an oxychloride.

While much information has already been obtained and hypotheses created, the fact remains that hard and fast standards cannot be recommended for the reason that the fundamental reactions are not yet understood. It is, however, reasonable to insist that the fungicides should contain at least 50 per cent. of copper if to be applied at the rate of two ounces per bushel of wheat, and the fineness should be such that the equivalent of one ounce of copper should be retained in the form of a fine powder on the wheat grains when dusted in an efficient pickler. Unless field trials show that an adulterant markedly increases the efficiency of the fungicide it should be prohibited; we know of no compound at present which would bring about such a desirable result.

Some of the samples were excluded from the 1927 and 1928 trials, but we have included "B," a commercially pure basic copper carbonate, and "D," a mixture of about one part of carbonate to three of a complex basic sulphate, together with "Smutol," an oxychloride, and "Vitrioline," a proprietary compound containing some water soluble copper. Samples "B" and "D" will be included in all future trials for purposes of comparison from year to year.

The rate of dosage of Bunt spores for the 1927 series was 20 parts of spores to 750 parts by weight of wheat, but so many of the control plants failed to reach maturity that, for 1928, the infection was reduced to 10 in 750. While earlier trials show that most of the copper dusts on sale to farmers will control the disease for lightly infected seed, it is necessary to

* 1. G. L. Sutton, Vol. III., No. 2, 1926. 2. E. J. Limbourn and G. L. Throssell, Vol. IV., No. 1, 1927.

use heavy dosages of spores to show big differences in the relative merits of the fungicides.

In 1928 five mixtures were prepared of different proportions of pure basic carbonate and basic sulphate and compared with "D" as well as "A 27," a mixture which gave good results in the field. "B 27" and "Antibunt," both basic carbonates, were also included in the series. The field trials with the mixtures, however, did not quite come up to expectations. Sample "M 3" has a composition similar to "D." It will be noticed, generally speaking, in the accompanying table that pure basic copper sulphate under the conditions of these experiments has better fungicidal properties than the basic carbonates. The basic sulphate used in 1927 contained 50 per cent. gypsum ($CaSO_4.2H_2O$) and gave very inferior results. The addition of basic carbonate to the basic sulphate reduced the fungicidal properties of the basic sulphate in the loam and increased them in the sandy soil.

The trials of 1928 were repeated in duplicate in different classes of soil. The plots were on flat country about half a mile apart and were therefore under similar climatic conditions. One soil, of similar type to that used in previous experiments, is a heavy chocolate loam of pH 7.1, and the other a poor yellow-brown sand containing a small fraction of clay and pH 5.8. The latter is not good wheat soil, but grows splendid rye. While the rate of infection in both soils is about the same for the controls, the disease is far more readily controlled in the light land than in the loam.

Small trials were also conducted in grey Perth sand containing about 3 per cent. organic matter and of reaction pH 6.1. The rate of infection of controls was high, while few of the mature infected and treated plants were diseased.

There is no doubt that the fungicidal properties of one particular fungicide depend upon the class of soil in which the dusted wheat is grown. Analysis of the water soluble extracts taken daily from different parts of the experimental plots showed marked variations, which may possibly account for the variation in counts of the same treatments in different portions of the plot. It was the exception to find an isolated bunted plant in a row, generally they appeared in twos and threes, sometimes even greater numbers being grouped together.

SUMMARY OF RESULTS.

1927 TRIALS. Infection 20 to 750.			1928 TRIALS. Infection 10 to 750.		
	Merredin Farm.	Chapman Farm.		Merredin Farm.	
				Loam Soil.	Sandy soil
Sample.	Percent bunted plants.	Percent bunted plants.	*Sample:*	Percent bunted plants.	Percent bunted plants.
A 25, ground to pass 200 mesh sieve	75	7	Antibunt	57	12
A 25	77	8	Mixture 5	31	4
A 27	61	4	Copper Hydroxide ...	31	3
B 27	77	7	A 27	26	3
B 25	77	7	B 27	51	7
C 25	69	6	B 25	33	3
D 25	63	6	Mixture 1	29	4
E 25	70	7	D 25	12	*Nil*
F 25	60	7	Mixture 2	29	3
Smutol	70	5	Mixture 3	27	3
Vitrioline	82	16	Smutol	48	3
Basic copper sulphate and gypsum	71	11	Vitrioline	41	12
Control	*	60	Basic copper sulphate...	21	6
			Mixture 4	31	2
			Control	83	91

* Owing to the great loss of plants due to secondary causes the controls were not counted.

PARTIAL CHEMICAL AND PHYSICAL COMPOSITION OF THE COPPER DUSTS.

Sample.	Percentage Cu.	Percentage CO_2.	Percentage Combined SO_3	Percentage Water soluble SO_3.	Percentage Cl.	Density lbs. per cub. foot.	Percentage retained on 200 mesh sieve.
A 25	46·48	0·88	0·43	3·83	17·09	63·2	43·6
B 25	50·04	17·64	·49	2·54	...	58·5	0·6
C 25	51·08	11·94	6·41	0·98	...	61·0	17·5
D 25	49·88	2·00	17·03	0·72	...	76·9	5·15
E 25	49·76	0·56	19·92	1·61	...	68·1	7·2
F 25	53·48	6·64	12·11	0·82	...	72·2	8·3
A 27	50·4	2·2	...	...	...	89·3	...
B 27	51·44	17·96	...	...	...	53·8	...
Antibunt	52·48	19·32	...	...	...	49·0	3·8
Pure Basic Sulphate	52·3	...	16·2	...	...	...	...
Copper Hydroxide	63·0	...	...	...	...	...	...
Smutol	54·36	...	...	...	15·08	...	12·2

The mixtures were prepared by mixing increasing proportions of Antibunt to the basic sulphate in the ratios 1–11, 9, 7, 5 and 4, and passing several times with brushing through a 200 mesh sieve.

The various treatments were divided into five sets of three treatments, with a control row of infected untreated seed between each set. Each set of three treated rows could therefore be compared with two control rows, one on either side.

To overcome any possible advantage to any one treatment, due to variation in the soil, the planting was replicated five times on each class of soil.

The planting was also planned on the "Chess-board" system as shown below, each set of three treatments being shown as Set A, B, etc. The control rows were continuous through the depth of the plot, but it will be seen that the continuation of any one row provides a control for an entirely different set of treatments, thus the control rows of Set A in Section "a" become the control row of Set B in Section "b."

																		Section
	Set E		Blank				Other	exp	eriment	s.								e.
	Set D		E		Balnk		A		B		C		D					d.
Control row.	Set C	Control row.	D	Control row.	E	Control row.	Blank	Control row.	A	Control row.	B	Control row.	C	Control row.				c.
	Set B		C		D		E		Blank		A		B					b.
	Set A		B		C		D		E		Blank		A					a.

METHOD OF PLANTING.

Before planting, a dressing of superphosphate at the rate of 120 lbs. per acre had been drilled in.

The rows for planting were opened out with a two-horse cultivator, three rows at once, each 2^1_4 links apart. All the rows for each planting were

opened out ready before planting commenced, and the whole planting completed in one day. That on the heavy soil was planted on 7th June, and on the sandy soil on 12th June. As in previous years, the seeds were planted by hand, 100 grains to each row. To avoid contamination between the various treatments the seed for each row was supplied in glass containers and planting was made direct from these containers. Each treatment was planted separately, the soil raked over the planted rows, and the hands thoroughly cleansed before commencing to plant a fresh treatment. Each seed was firmed into the soil so that the average depth when covered should be 1 inch.

Blank rows were left at intervals throughout both plantings, so that soil samples could be taken when required. These samples were taken daily for twenty days after planting, and once each week from then until the third week in August. Soil temperatures were also taken each morning for the first twenty days after planting.

During the germinating period a count was taken of the number of seedlings showing above the ground at intervals of 10 days until 30 days after planting. During the early stages of growth evidence was again found pointing to the control of the seedling rot (*Pleosphaeria semenperda*), the disease being found only in the control rows, as in previous years. It was also noted that the disease only appeared after a crust had formed on the soil, due to heavy rain. While it was possible to keep the rows inter-cultivated the disease did not appear, but during July, when the rains were too regular to permit of cultivation, quite a number of plants became affected.

This disease would probably not be noticed in a paddock planting, but it may be the cause of "thin patches" that appear during the season, and is another reason for the thorough use of copper dusts as a fungicide. The main indication of its presence is the stunted appearance of the seedlings, the leaves of which commence to rot at the surface of the soil, rapidly turn brown, and die.

Observations of growth of the plants were made from time to time, but owing chiefly to the slow, irregular germination, no definite comparison could be made between the various treatments and the controls.

On the heavy soil, at maturity, there appeared to be a slight difference in favour of the plants in the treated rows, although no difference could be noted between the treated rows and the rows planted with clean seed. This would seem to point to Bunt having a stunting effect on the plants, but when we consider the percentage of Bunt appearing in the treated rows, this fact is not very definite.

To obtain the results of the experiment, all Bunt-infected plants were first cut back, leaving about a foot of straw standing. These butts were then counted, each row being taken separately, and then a count taken of the clean plants that had been left complete.

From these figures the percentage of infection was calculated, and a comparison made between each treatment and the control rows. Infected plants only were counted; should only one head be bunted, then the fungicide has failed to function properly.

CHEAP PASTURE PRODUCTION.

G. K. Baron-Hay,
Assistant Superintendent of Dairying.

In 1920 the Department of Agriculture issued a Bulletin* dealing with factors which were considered essential for the successful establishment of the Dairying Industry in the South-West portion of this State. A leading position was then given to the economical production of permanent pasture. It was pointed out that in heavily-timbered country the cost of clearing such land "lock, stock and barrel" was too high, and a method of establishing pasture with a minimum of clearing or cultivation was advocated. At that time this practice met with very little support.

Illustration 1.

G. McCarthy, "Richon," Armadale. First year treatment stony hill country. Subterranean clover seed, 2lbs. per acre. Superphosphate, 1 cwt. per acre.

In 1923 a campaign advocating the fertilising of pastures with a phosphatic manure was launched which brought into prominence the great value of Subterranean Clover for the production of good pasture under the

* "Success of Dairying in the South-West." P. G. Hampshire.

most unpromising conditions. Topdressing pastures with a phosphatic fertiliser, usually superphosphate, may now be said to be a general practice throughout the pastoral districts, and the results obtained have induced farmers to realise that pasture can be established on many types of land with very little clearing or cultivation, and at a fraction of the cost originally thought necessary.

There are large areas of land, embracing several soil types, lying in the district between Armadale to Busselton, on which useful pasture may be very cheaply established.

ROUGH HILLY COUNTRY.

Excellent results may be obtained on the slopes of the Darling Range escarpment, where the soil is of granitic or dioritic origin, below the lateritic caps.

These hills are usually too steep or stony for cultivation, and do not pay to clear, though generally the timber is open in character. (See Illustration 1.)

By ringbarking the timber where necessary, slashing scrub if thick, and putting through a fire, and then sowing Subterranean Clover seed, good pasture may be cheaply established. The writer has seen good results with clean Subterranean Clover seed and also with seed in the "burr." As it is often impossible to drive a drill or broadcaster over this country, the use of clean seed is advocated at the rate of 3 lbs. per acre. The seed may be mixed with the superphosphate (one bag per acre), and the two applied at the one operation. Where "burr" is used the fertiliser must be applied after the seed, and on rough country there is a difficulty in fertilising the same spots as where the "burr" has been scattered. Other points in favour of the use of clean seed are given later in this article. A broadcaster of the type which is driven from the back of a cart does useful work on this type of country, wherever a cart can be driven.

These soils being well drained are warm in the winter time, and supply pasturage earlier than do the wetter flats below them. They do not, as might be expected, carry the feed green as long into the spring as the latter, but are greatly appreciated by cattle during the winter, which are found on these hills in preference to the flat country.

Where the ground is of a hard nature, it is advisable to delay sowing the seed and fertiliser till after the first winter rains, as if a dry spell should follow the germination of the seed, there would be a danger of the seed malting. There is little danger once the roots have penetrated the ground. Mr. H. Throssell, Greenmount, has obtained good results on hill country without any clearing work at all, the clover thriving among the scrub, which is not thick, and only averaging two feet high. Mr. G. McCarthy, "Richon," Armadale, has also obtained good results with clean seed, on dioritic land, so stony that it is difficult to walk over. Mr. W. E. White, Wokalup, has some fine pasture on hill land, some of which has been established without burning or clearing, and some of which has been rung and burnt before sowing. On these areas, and on others which might be quoted, land which, until quite recently, was looked upon as of little value from a pasture point of view, may now be considered good early winter grazing.

NORTH DANDALUP TO WAGERUP.

Lying between these two centres, in addition to land usually considered suitable for the production of crops and pasture, there stretch areas of flat sandy loams, overlying clay at a depth of usually one to two feet, and which, owing to their being waterlogged (often completely inundated, in the rainy season), have been in the main left severely alone.

The timber consists of stunted Jarrah, Blackboys and Christmas Trees. East of Pinjarra, to the hills, the timber becomes more open and the clay reaches almost to the surface.

Illustration 2.

Graves Mitchell, Harvey. First year treatment, no clearing and under green timber. Light gravelly loam overlying clay. Photo. taken 18 weeks after sowing subterranean clover.

The effect of ploughing such land for the sowing of crops or pasture has been to puddle it so badly that very poor results are obtained for some time after being broken up. It is also unable, after being ploughed, to carry stock until well into the spring. Good results have, however, been obtained by pulling the blackboys, ringing trees where necessary, burning, and then sowing Subterranean Clover seed, without ploughing, or at the most, running a disc harrow over the land before sowing. Mr. Hobart Tuckey, Pinjarra, has led the way in his district, and others are now following his example.

Mr. Tuckey, in 1926, sowed an area of 18 acres without even burning the scrub after the blackboys had been pulled, using 1½ lbs. of clean Subterranean Clover seed and one bag of superphosphate per acre. Growth was slow the first year owing to the light dressing of seed, but when inspected last year, after having been topdressed annually with one cwt. of

superphosphate per acre, presented a uniform mass of fodder 18in. high, consisting almost solely of Subterranean Clover and Drooping Flowered Clover. This latter clover seems ubiquitous on all this wet low-lying land, and soon makes its appearance after phosphatic fertilisers have been applied.

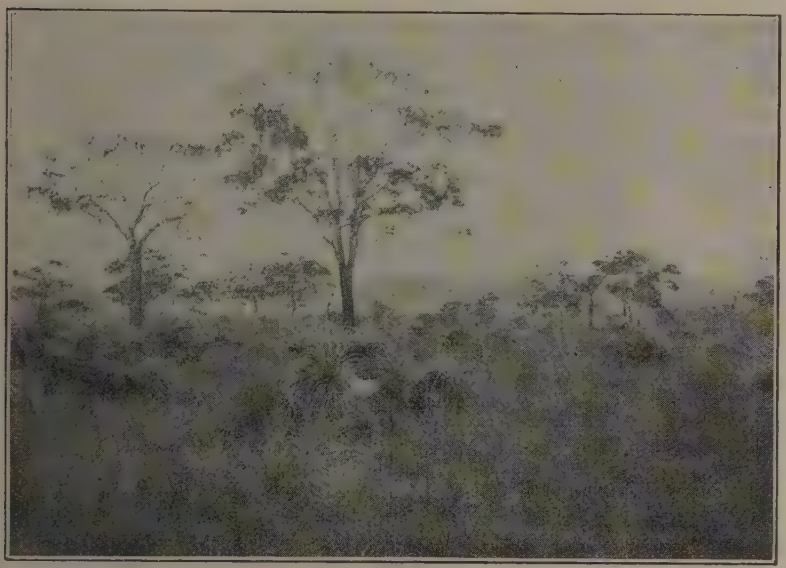


Illustration 3.

Type of country being successfully treated at Pinjarra. Thin layer soil overlying grey clay. Waterlogged in rainy season.

An area alongside the above field, which had been sown by the then orthodox method of ploughing and cultivating before seeding showed results not comparable with those obtained by the cheaper method. (See Illustration 4.)

Mr. W. E. McLarty in 1927 layed down 30 acres of similar land without ploughing with good results, but prefers to disc cultivate prior to sowing the seed and fertiliser.

In the writer's opinion 1½ lbs. of clean seed is too light, and 3 lbs. per acre is recommended to be sown after the first rains have started.

EXPERIMENT IN PASTURE ESTABLISHMENT, DRAKESBROOK.

At the request of the North Drakesbrook Progress Association an experiment has been commenced on the above type of land to demonstrate several points of value in the cheap development of pasture. Although the experiment is not yet completed, several useful facts have been demonstrated.

Ploughed versus Unploughed Land.

At the end of the growing period the growth of clovers was good on all plots, but a far earlier growth was obtained on the unploughed areas, and gave a greater bulk of fodder in spring. For grazing it would have been impossible to have grazed the ploughed plots, as the stock would have buried the young plants in the soft earth. The ground, however, where it had not been ploughed would have carried stock at any time of the winter. From the point of view of cost also the unploughed land has the advantage.

Pasture Plants to Sow.

Various pasture plants were sown to demonstrate which plants would provide good returns on this type of soil. The mixtures included Subterranean Clover, White Dutch Clover, Crimson Clover, Lotus Major, Perennial Rye Grass, Paspalum Dilatatum, and Cocksfoot. It was apparent from the growth during the winter and spring that for the quick establishment of pasture on this type of country and under rough conditions, Subterranean Clover alone should be relied upon, at least in the few initial years.

Illustration 4.

Hobart Tuckey, Pinjarra. Country similar to that depicted in Illustration 3, in third season of treatment. (See letterpress.)

Clean Subterranean Clover seed or in the "burr."

The Department has always advocated the use of clean seed in the sowing of Subterranean Clover, and the experiment was designed to demonstrate that as good results could be obtained from the use of clean seed,

with other advantages, as from the sowing of seed in the "burr," which practice has been favoured by the majority of farmers. (See Illustration 5.)

Clean seed was sown at the rate of 4 lbs. per acre, which was estimated to give the same amount of seed as was contained in the sample of "burr" which was used. On the Field Day held in November to inspect these plots, there was very little difference to be noticed between the two, if anything it was in favour of the clean seed, which was more evenly distributed over the area. The superphosphate was applied at the rate of 200 lbs. per acre. Where clean seed is used care should be taken to sow after the first rains have started, especially if the ground be hard. The sowing of these plots was carried out early in May.

It is claimed that equally good results can be obtained from clean seed as from "burr," together with a number of very definite advantages, enumerated below.

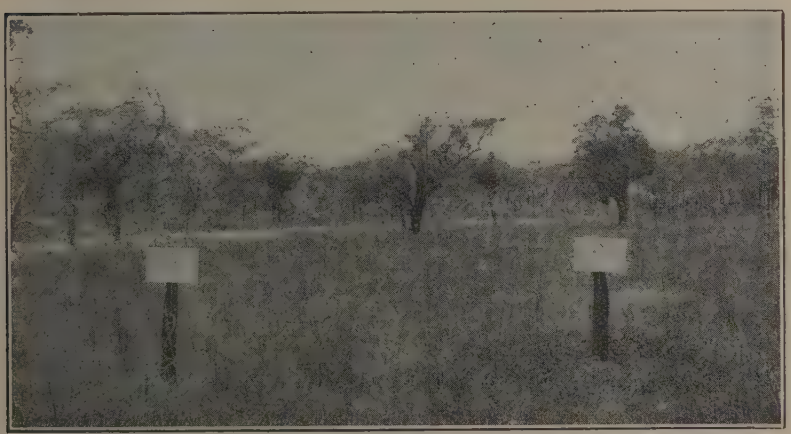


Illustration 5.

Demonstration Plots on Mr. O. Bowles' farm, Waroona, to show relative merits clean subterranean clover seed and "burr" for sowing on uncultivated land. (Left: Seed in "Burr." Right: Clean Seed.)

1. When purchasing clean seed, the purchaser is protected by the provisions of the Pure Seeds Act, by which the vendor must state the percentage of viable seeds, and also the percentage of weed seeds. When purchasing "burr" seed this is impossible, as this class of seed is not sold by registered seed merchants, but by individual farmers. It is also quite impossible to tell by inspection that one has a good sample of viable seed in the burr. This was forcibly brought home to the writer when inspecting a clover cleaning plant. Two samples of clean "burr" were seen, which in appearance presented very few differences, but on being threshed out yielded very different quantities of clean seed, as the following figures show. Both samples were grown on the same type of land, in fact, on adjoining farms.

Seed obtained from two samples of "Burr" similar in appearance.

Sample A—

"Burr," 40 bags; clean seed, 510 lbs.; value of bag at 2s. 3d. per lb. Clean Seed, 28s. 8d.

Sample B—

"Bur," 40 bags; Clean Seed, 1,300 lbs.; value of bag at 2s. 3d. per lb. clean seed, 73s. 1½d.

These figures explain the conflicting reports obtained as to the bulk of feed obtained the first year after sowing Subterranean Clover with "burr" seed.

2. Clean seed may be inspected for seeds of undesirable weeds, notably Dodder. This is difficult with "burr." There is good evidence that the remarkable spread of some weeds in the South-West during the

Illustration 6.

A field at Harvey showing folly of sowing subterranean clover seed in "burr." Field infested with "Yellow Weed" (Bartsia trixago var.). Adjoining fields are clean.

last few years has been through their carriage in bags of "burr" clover seed. (See Illustration 6.) The great bulk of these weed seeds are removed in the process of winnowing and separating the husk from the clean seed. Moreover, vendors of clean seed inspect the paddocks from which their "burr" is obtained, and do not thresh the seed from badly-infested paddocks.

3. The rapid spread of the Red Legged Earth Mite and the Lucerne Flea through the clover-growing districts may possibly be ascribed to the

transference of their eggs in the bags of "burr"seed. This point, however, has not been definitely proved.

4. Clean seed can be applied more cheaply and evenly than in the "burr." Clean seed is usually mixed with the fertiliser for sowing, and provided this is not done more than four hours before sowing no ill effects will result. The seed and the fertiliser are therefore deposited together on the ground. With "burr" the ground must be traversed twice, and the fertiliser is often deposited where there is no seed, especially on rough country.

5. The percentage of germination is higher with clean seed than with seed in the "burr." Seed in the "burr" may show as low a percentage germination as 30 per cent., while 90 per cent. germination is not unusual with a good sample of clean seed. This is because the small, ill-shaped and light seeds are removed during the process of cleaning, only the good sound seed appearing in the final sample.

CLAY FLATS, COOKERNUP-BRUNSWICK-WATERLOO.

Probably no soils have responded more rapidly to cheap methods of pasture production than have the clay soils situated at the foot of the Darling Ranges. In their unimproved condition these soils carry Red Gum timber, thick fibrous scrub averaging two to three feet in height, and are badly water-logged in the winter months.

After drainage good results are obtained by burning the scrub, and applying Subterranean Clover seed at the rate of 2 to 3 lbs. per acre, together with 1 cwt. to 1 bag of superphosphate per acre. On these soils it is important where clean seed is being used, and which is recommended, that the application of seed and fertiliser be delayed until the soil is damp, as otherwise there is a danger of the young root not being able to force its way into the stiff soil, which are extremely hard when dry. The use of clover seed in the "burr" is only recommended where the farmer has gathered his own "burr," and is thus certain that no undesirable weed seed or pests have been on the area from where the seed has been gathered.

The success of this method of establishing pasture on any soils by this method depends to a great extent on judicious stocking the first year. Stock should not be allowed on the area being treated the first year until the plants have seeded and the clover seeds have "rooted," and therefore cannot be pulled up by stock when eating the runners. At this stage heavy stocking is recommended, so as to assist in destroying the young scrub which is sure to have sprouted during the winter months.

It is believed that by adopting these rough but economical methods for the production of feed, the whole area of the farm can be made productive in a comparatively short period. Areas successfully laid down by this method may be seen on the farms of Messrs. O. E. Titley, Brunswick, who has 100 acres now under good pasture established by this method; F. Reeve, Brunswick, who has been able to rake seed from an area now in its third year; O. Rath, Harvey, an old established farmer, but who is adopting these new methods in the development of a new area recently acquired; C. C. Leitch, Trigwell Estate, Boyanup, now milking over 20 cows, who has not

used a plough for the sowing of any pasture (see Illustration 7); and C. M. Scott, Elgin, one of the largest dairymen in the State.

Illustration 7.

C. C. Leitch, Trigwell Estate, Boyanup. Yellow clay country, of little value till drained. Mr. Leitch has established all his pasture without ploughing.

This method of rapidly bringing the land into profit enables the dairy farmer to have very little unproductive land on the farm, and when the whole is thus bringing in revenue, the work of total clearing can be continued, and the farm gradually brought into a fully improved condition.

FARMERS' FIELD TRIALS, 1928.

G. L. Throssell,
Dipl. Agric., Agricultural Adviser.

At Lake Brown (J. Mulqueeny).

The trials this year were a continuation of the previous trials, with the addition of the early variety (Geeralying) in the Variety Trial.

The land on which the trials were conducted was a typical red loam, originally carrying Salmon Gum and Gimlet timber. It was fallowed to a depth of 3-4 inches in August, 1927, with a disc implement (Sundercut), cultivated with the same implement about the end of August, and again on 28th April and with a springtyne after rain on 19th May, and it was also harrowed after rain on 22nd May.

The plots, which were each half an acre in area, were duplicated, and were planted on 28th and 29th May. In the variety trial the wheat was planted at the rate of 45 lbs. per acre and superphosphate at 75 lbs. per acre. The variety Noongaar was used in the rate of seeding trial, and superphosphate at 75 lbs. per acre.

The rainfall, as officially recorded to the end of October, is as follows:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total, May to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.	
Lake Brown ...	31	...	50	89	89	85	189	97	30	...	490

The dry spring, summer, and autumn left little or no reserves of moisture in the soil. The rains during the growing period were below the average and were characterised by light showers followed by heavy winds. The winter passed without a good soaking downpour. September was a particularly trying month, severe frosts being recorded during the first week, and only 30 points of rain were recorded, spread over seven days, the highest fall being eight points. No rain fell during October and the total for the growing period was 490 points. The results of the trials are tabulated below: –

Wheat Variety Trial, 1928.

Seed—45lbs. per acre. Superphosphate—75lbs. per Acre. Planted 28th May, 1928.

Variety.	Section 1.	Section 2.	Average, 1928.	Average, 1927-28.
	Yield per Acre.	Yield per Acre.	Yield per Acre.	Yield per Acre.
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.
S.H.J.	2 56	2 50	2 53	7 36
Gluyas Early	5 36	5 52	5 44	9 50
Geeralying	4 16	3 26	3 52	...
Gluyas Early	5 52	6 16	6 4	9 50
Noongaar	4 58	4 32	4 46	8 42

Rate of Seeding Trial.

Variety—Noongaar. Superphosphate—75lbs. per Acre. Planted—29th May, 1928.

Rate of Seed.	Section 1. Yield per Acre.	Section 2. Yield per Acre.	Average, 1928. Yield per Acre.	Average, 1927-28. Yield per Acre.
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.
30 lbs.	4 22	6 6	5 14	9 48
45 lbs.	4 16	5 16	6 26	9 46
60 lbs.	4 4	4 2	4 4	9 42

These results, which are for a period of two years only, confirm those obtained at other centre., where the very early varieties have not displaced the early variety, Gluyas Early, as the most suitable for districts of low rainfall.

At East Goomarin (E. Randolph).

The trials conducted this year were a repetition of last year's, with the exception that the variety Geeralying was added to the Variety Trial—the rate of seeding trial being unaltered.

The soil was a fine red loam, originally carrying Morrell, mixed with Salmon and Gimlet. It was fallowed in June, 1927, with a disc implement to a depth of 3in. and the growth of self-sown wheat, in the absence of sheep, necessitated it being reploughed three times, these operations being completed in August. A springtyne cultivator was used on the 15th September, 3rd October, 25th May and 5th June. The mulch was in good tilth, the seed bed well consolidated, free of weeds and had a good moisture content.

The plots were planted on June 5th and 7th, seeding having been delayed a week on account of rain. The variety trial was sown at the rate of 45lbs. of seed and 80lbs. of superphosphate applied to all plots. The wheat was dry pickled with copper carbonate. The variety Noongaar was used in the Rate of Seeding Trial. 80lbs. of superphosphate per acre being applied to all plots.

The rainfall as officially recorded to the end of October is shown in the accompanying table:—

——	Jan.	Feb.	Mar.	Apl.	Growing Period. May.	June.	July.	Aug.	Sept.	Oct.	Total, May to Oct.
East Goomarin ...	84	...	51	80	121	93	182	163	79	...	638

The spring, summer, and autumn months were very dry and the seeding rains were very late. All the rain fell in light showers during the growing period and the winter was passed without good soaking rains, leaving no reserves of moisture in the soil. The months of September and October were very critical ones, no rain being recorded in the latter month, and 79 points only in September, spread over a number of days.

The results are shown hereunder:—

Wheat Variety Trial.

Seed—45lbs. per acre. Superhposphate—80 lbs. per acre. Planted—6th June.

Variety.	Section 1.	Section 2.	Average, 1928.	Average, 3 years 1926–27–28.
	Yield per Acre.	Yield per Acre.	Yield per Acre.	Yield per Acre.
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.
S.H.J.	7 16	7 20	7 18	11 36
Gluyas Early	10 56	11 16	11 16	15 16
Geeralying	9 28	9 32	9 30	...
Gluyas Early	11 16	11 58	11 36	15 16
Noongaar	10 6	9 46	9 56	13 40

Rate of Seeding Trial.

Variety—Noongaar. Superphosphate—80lbs. per acre. Planted —7th June, 1928.

Rate of Seed per Acre.	Section 1.	Section 2.	Average, 1928.	Average, 2 years, 1927–28.
	Yield per Acre.	Yield per Acre.	Yield per Acre.	Yield per Acre.
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.
30lbs.	9 54	11 8	10 32	12 16
45lbs.	11 16	10 42	11 0	12 50
60lbs.	10 4	10 16	10 11	12 46

These results, which are for a period of three years, show that the variety Gluyas Early has yielded the best over this period, and that both Noongaar and Geeralying show promise as very early varieties, suitable for late seeding. In the rate of seeding trial, which has been conducted for two years, 45lbs. of seed per acre has given the best returns, although the difference between the different rates is not great. It does indicate, however, that there is no advantage to be gained by increasing the rate of seeding above 45lbs. per acre.

At North Kununoppin (A. E. Hughes).

Two trials were conducted on this property, namely, a Wheat Variety Trial and a Rate of Superphosphate Experiment.

The soil was a friable loam, originally carrying Jam, Salmon Gum, and Gimlet. It was ploughed with a disc implement (Sundercut) to a depth of 4ins. in June, 1927, cultivated with the same implement in August, with a springtyne after rain, 4th May, and again prior to seeding on 15th May. The plots, which were planted on the 15th and 16th May, were each half an acre in area and were duplicated.

Seed was applied at the rate of 45lbs. per acre on all plots, and was dry pickled with copper carbonate. 90lbs. of superphosphate per acre was applied to all plots in the Variety Trial and at the required rates in the Rate of Superphosphate Trial.

The rainfall recorded to the end of October is shown hereunder:—

	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total, May to Oct.
					May.	June.	July.	Aug.	Sept.	Oct.	
N. Kununoppin ...	125	...	58	91	125	73	266	145	51	8	668

The season has been one of the most phenomenal since 1914. No rains of any consequence fell during the spring and summer apart from 125 points in January. The autumn rains were very light and did not afford an opportunity of destroying weed seeds or preparing a seed bed. The seeding rains were very late, but a useful rain fell after the plots were planted, resulting in an even germination. From then on until the middle of July the rains were very sparse, and the wheats made very little progress, giving the weeds a chance. Good rains fell during July and August, but September and October were exceedingly dry, forcing the wheats into ear. Noongaar came into ear about the middle of August, Geeralying on the 24th August and S.J.H. and Gluyas Early during the first week in September. Despite the absence of rain, the mild weather towards maturity minimised to a great extent the formation of pinched grain.

The tabulated results are as hereunder:—

WHEAT VARIETY TRIAL.

Seed—45lbs. per acre. Superphosphate—90lbs. per acre. Planted 16th May.

Variety	Section 1. Yield per acre.		Section 2. Yield per acre.		Average. Yield per acre.	
	bus.	lbs.	bus.	lbs.	bus.	lbs.
S.H.J.	19	48	13	32	16	40
Gluyas Early	19	50	19	11	19	31
Geeralying	19	1	14	31	16	46
Gluyas Early	19	11	14	52	17	2
Noongaar	19	25	18	38	19	3

RATE OF SUPERPHOSPHATE TRIAL.

Variety—Gluyas Early. Seed—45lbs. per acre. Planted 15th May.

Rate of Super.	Section 1. Yield per acre.		Section 2. Yield per acre.		Average. Yield per acre.	
	bus.	lbs.	bus.	lbs.	bus.	lbs.
150 lbs.	16	50	17	17	17	4
75 lbs.	14	25	15	43	15	4
225 lbs.	16	5	15	27	15	47

As this is the first year that trials have been conducted here, no definite conclusions can be made. The results of the variety trial, however, are substantiated by trials at other centres. Considerable variation in the plots of the superphosphate trial, due to hard patches, reduces the accuracy of the trial.

JUNIOR FIELD TRIALS, 1928.

E. J. Limbourn,
Seedsman, Merredin Experiment Farm.

These trials were planted on similar lines to those of previous years, both wheat and oats being included.

Each variety was sown down two tubes of the drill, a drill width containing five varieties with the control variety Gluyas Early on either side.

The length of the plots as planted, was 10 chains, which was later subdivided into 10 sections of 87 links, with a division of four links between each section, the balance of the plot forming a headland.

Three of these sections were harvested as hay, six for grain and one was left standing, so that information regarding the strength of straw and ability of the different varieties to hold their grain could be obtained.

The oat section of the trials was planted on 8th May and the wheat section on 19th May.

At time of planting the fallow contained very little moisture, and germination was both slow and irregular. However, there appeared to be very little malting, the final germination being generally good.

The seed was sown at the rate of 45lbs. with an application of 120lbs. of superphosphate per acre.

The season has been one of low rainfall, with long dry spells at critical periods. The monthly rainfall records are as follow, July and August being the only two months to exceed the average:—

	Jan.	Feb.	Mar.	Useful Rains.								Nov.	Dec.	Year
				Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Total.			
1928 ...	39	...	101	58	76	107	224	154	71	19	709	...	24	873
Average...	56	50	113	76	124	174	186	135	97	80	872	36	59	1,186

Following on a very dry summer, April had only four wet days. The highest daily registration was 53 points on the 28th.

May was without rain until the 20th, and had only four wet days. The highest daily fall was 25 points, registered on the 30th.

Between 30th May and 2nd June 61 points fell, followed by 61 points between 6th and 9th June, these two falls being responsible for the majority of the germination.

June had altogether nine wet days, the highest daily fall being 57 points on the 9th.

Only four points fell between June 9th and 29th, s spell of nearly three weeks, causing a serious check to the young seedlings.

Rain fell fairly regularly during July, there being 17 wet days. 70 points were registered on the 9th, but the average daily fall for the wet days of the month was only 13 points.

August averaged 14 points per day for the eleven days on which rain fell, the highest being 64 points on the 5th.

38 points fell on 3rd September, otherwise the rain was very light, although there were altogether 11 wet days during this month. There were

two spells of six days without rain, so that after the 3rd of the month practically no useful ran fell.

October had two wet days only, 17 points on the 13th and two points on the 21st.

Several severe frosts were recorded during the latter part of September and early October, light frosts continuing right throughout October.

Fortunatey, temperatures during September and October were exceptionally low, fairly good dews or frost appearing every night. This, no doubt, helped the later varieties to mature normally, and although the ears of such varieties were badly tipped, the mature grain was of a better sample than from earlier varieties.

As would be expected, growth generally was shorter than usual, ears were small and only matured two grains to each spikelet.

Very marked variations occur in the yields from the different sections. This appears to be due mainly to soil variation and partly to the presence of patches of Take-all. Weed growth was negligible. Flag Smut was found in "Gluyas Early" and the new crossbred M 32 (Florence x Fortune). Take-all attacked all varieties, more or less, although it was very noticeable that in a bad patch of the disease, the variety "Noongaar" had suffered much less than varieties on either side of it.

The outstanding feature of this season is the success of the new crossbred wheat M. 20 (Nabawa x Gluyas Early), both as regards the yields for hay and grain, and its resistance to Flag Smut, as shown in the resistance test carried out with that disease.

Several other crossbreds show great promise, but this one stands out prominently, and easily excels all other varieties under test.

Brief notes regarding the characteristics of the varieties tested are given below:—

Wheat Varieties.

Carrabin P. 1437.

Type:—White, tapering compact ear, strong straw, usually of medium height. Grain is classed as Premier Strong White, and compares very favourably with Comeback. Yields well in normal years, but is very tough to strip. Very resistant to disease. Maturity—Early.

This is one of the varieties distributed by the Department of Agriculture under their Pure Seed Scheme. It was included in the test for comparson with the new crossbreeds having good quality grain.

C. 74 D.A.C. 4179 x Quality.

Type:—White, tapering ear, fairly compact, with tip awn. Inclined to lodge a little, and also to shed its grain. Grain—strong white, rather pinched this season. Resistant to Flag Smut and Bunt, liable to Take-all. Maturity—late mid-season.

This is variety bred at the Chapman Experiment Farm and is apparently not suitable for our drier conditions. During 1927 it showed marked resistance to the Root-rot (*Wojnowicia graminis*) that was prevalent that season, but was badly attacked by Take-all (*Ophiobolus graminis*) this year.

M. 28 (Dindiloa x Nabawa).

Type:—White, tapering ear, fairly compact, with tip awn. Strong straw, does not shed. Fairly resistant to Bunt and Flag Smut.

This variety is being discarded in account of probable difficulty in stripping, being, if anything, worse than Carrabin.

M. 30 (*Dindiloa x Nabawa*).

This is quite similar in type to M. 28 and like it, is difficult to strip.

M. 18 (*Federation x Bunyip*).

Type:—Brown, tapering ear, rather open, with tip awn. Lodges rather badly and inclined to shed. Grain rather poor. Resistant to Flag Smut, but liable to Bunt. Maturity—very early.

This variety is being discarded on account of weak straw.

M. 24 (*Florence x Carrabin*).

Type:—White, tapering ear, compact, without awn. Good straw, does not shed. Grain Premier strong white. Further selection for a free stripping strain will be carried out with this variety.

M. 32 (*Florence x Fortune*).

Type:—White, tapering ear, fairly compact, with tip awn. Straw of good height and stands well, does not shed its grain. Liable to Bunt and Flag Smut. Maturity—Early. A very promising type, especially for hay, but requires further selection for resistance to disease.

M. 33 (*Florence x Nabawa*).

Type:—White, tapering ear, fairly compact, tip awns. Stands well, average height; does not shed its grain. Liable to Bunt, but resistant to Flag Smut. Maturity—Early.

A very promising crossbred, with strong milling grain. Free stripping and has yielded rather better than Carrabin this season.

Gluclub P. 1787.

Type:—Brown, clubbed ear, very compact, with tip awns. Stands up well, but is inclined to shed a little. Very liable to both Bunt and Flag Smut. Maturity—Midseason.

A selection by Messrs. Smith & Sons, of Yarding, W.A. Yields well, but very disease liable.

M. 31 (*Gluyas Early x Nabawa*).

Type:—White, tapering ear, compact, with tip awn. Stands up well, does not shed. Liable to Bunt, but resistant to Flag Smut. Maturity—Midseason.

Has yielded rather better than Nabawa, which it closely resembles. Very promising.

M. 14 (*Nabawa x Bunyip*).

Type:—White, tapering ear, fairly compact, with tip awn. Tall growing and stands fairly well, does not shed. Liable to Bunt, but very resistant to Flag Smut. Maturity:—Very early, about a week earlier than Gluyas Early.

A very promising type for districts with a short season. Not as early as "Noongaar," but has given rather better results this season. It is a selection made at Merredin Experiment Farm from a cross made at the Chapman Experiment Farm in 1918.

M. 26 (*Nabawa x Carrabin*).

Type:—White, tapering ear, fairly compact, without awn. Stands up well, medium height, does not shed. Shows immunity to Flag Smut, but is liable to Bunt. Maturity—Midseason.

This should prove a useful variety, having a strong milling grain, free stripping and yielding well. It has immunity to Flag Smut of its parent type, "Nabawa," and in quality of grain is about equal to Carrabin.

M. 20 (*Nabawa x Gluyas Early*).

Type:—White, tapering ear, fairly compact, with tip awn. Slender semi-solid straw, similar to Gluyas Early, stands fairly well, does not shed. Grain strong white, very like Nabawa. Liable to Bunt, but highly resistant to Flag Smut. Maturity—Early.

Here is a variety that promises to prove equal or better than Gluyas Early for yield, both of grain and hay. Its resistance to Flag Smut gives it a big advantage over that variety and if further trials are consistent with this season's results, it should prove a very useful variety.

The original cross was made at the Chapman Experiment Farm in 1918 seed from the first (F1) generation being sent to this farm for selection. The type known as M. 20 was fixed in 1924 and has since then been under observation without showing any variations.

Noongaar P. 1769 (*W.A.*).

Type:—White, tapering ear, small, rather open, without awns. Slender semi-solid straw, medium height, stands fairly well. Does not shed. Liable to both Bunt and Flag Smut. Maturity—Very early.

This variety is the most recent introduction by the Department of Agriculture and is proving itself of value in the wheat areas east of Merredin On account of its quick growth, it can be planted late without any danger from a lack of spring rains.

Patriot P. 1463 (*Q*).

Type:—White, tapering ear, rather open, without awn. Stands up well, but is inclined to shed a little. Susceptible to both Bunt and Flag Smut. Maturity—Early.

In previous trials this variety showed rather promising, but apparently it requires a fairly consistent rainfall to bring it to maturity normally. Its susceptbility to the Smut disease is also a big disadvantage, and it is not proposed to carry the trials with this variety any further.

Ranee P. 1697 (*Viet.*).

Type:—Brown, tapering ear, compast, with tip awn. Short, stout straw, stands well, does not shed. Very suspectible to both Bunt and Flag Smut. Maturity—Late-midseason. Yields rather well, but is too disease liable.

C. 51 (*Toby's Tusk x Gluyas Early*).

Type:—White, square tipped ear, fairly compact, with tip awn. Rather tall growing, and inclined to lodge. Maturity—Early.

Results of trials very disappointing—cannot stand up to dry conditions.

Waratah P. 1627 (*N.S.W.*)

Type:—Brown, tapering ear, rather open, with tip awn. Tall growing, but stands well, inclined to shed a little. Susceptible to both Bunt and Flag Smut. Maturity—Midseason.

This variety has given good yields for three seasons, and is evidently productive under our conditions. It is hoped, by crossbreeding, to improve its disease resistance, and overcome its liability to shed its grain.

Oat Varieties.

C. 72 (*Algerian x Sunrise*).

A new crossbred oat from the Chapman Experiment Farm. Made rather better growth than Algerian in the Test Row plantings but is altogether too late for our conditions.

C. 93 (*Algerian x Ruakura*).

Another new crossbred from the Chapman Experiment Farm unsuitable under our conditions.

Belar P. 1740 (*N.S.W.*)

Not suitable for light rainfall districts, being rather later than Guyra. Its actual yield, however, compares very favourably with that variety, and it would probably give good results with a moderate rainfall. It has a very fair quality grain, light in colour, and rather stout straw.

Buddah P. 1632 (*N.S.W.*).

A good early variety of the "Sunrise" type. Not equal to Mulga under our condiitons.

Gidgee P. 1737 (*W.A. selection from a N.S.W. variety*).

Very similar to Guyra, but matures earlier and has given better results this season than that variety.

C. 87 (*Lachlan x Sunrise*).

Rather better than C. 72 and C. 93, but still not very promising.

Palestine Oats P. 1716.

Short in straw, very quick growing. Of use only as a grain producer; very prolific. Grain somewhat like Algerian, dark brown, very coarse hulls.

P. 1724 (*Un-named Oat*).

This is an oat sent to us by Mr. R. N. Bell, Agricultural Bank Inspector, of Balingup, for identification. It has been identified as an early strain of "Burt's Early."

The results of the trials, as given in the following tables, are of use only as an indication of the possible comparative productivity of the different varieties. Every care is taken to keep the yields as accurate as possible, but the loss in threshing is too irregular for any definite yield per acre being stated.

The area harvested per section of any one variety is approximately 1/640 of an acre, the total area per variety being:—

6/640ths. of an acre for grain and 3/640ths of an acre for hay.

The plots are harvested by hand, each section and variety being cut separately and the sheaf or sheaves labelled.

For hay the varieties are cut as near as possible at the same stage of maturity and the sheaves stooked in the paddock until sufficiently dry for carting. Each sheaf is then weighed to the nearest ¼lb. and the weights recorded.

For grain the varieties are not cut until they would be fit for stripping. When cut the sheaves are stooked until it is convenient to thresh them by means of a small peg-drum thresher and winnower machine. The yield of grain from each section is naturally very small, and to get the results of the trial as accurate as possible, weights are taken to the nearest ⅛th of an ounce.

JUNIOR FIELD TRIALS, 1928.

MERREDIN EXPERIMENTAL FARM.

Summary of Results with Wheat Varieties.

Variety.	Reg. No.	Season of Maturity.	Average height in inches.	Percentage Yields.	
				Grain.	Hay.
Carrabin	P. 1437	Early	36	83	83
(D.A.C. 4179 x Quality) ...	C. 74	Late midseason ...	34	80	80
(Dindiloa x Nabawa)	M. 28	Early	36	81	81
(Dindiloa x Nabawa)	M. 30	Early	36	101	99
(Federation x Bunyip) ...	M. 18	Very early ...	38	79	74
(Florence x Carrabin)	M. 24	Early	38	72	84
(Florence x Fortune)	M. 32	Early	43	96	106
(Florence x Nabawa)	M. 33	Early	36	85	91
Gluclub	P. 1787	Midseason	40	114	103
Gluyas Early	P. 159	Early	40	100	100
(Gluyas Early x Nabawa) ...	M. 31	Midseason	39	101	84
Nabawa	P. 1432	Midseason	40	97	79
(Nabawa x Bunyip)	M. 14	Very early ...	42	96	86
(Nabawa x Carrabin)	M. 26	Midseason	40	93	81
(Nabawa x Gluyas Early) ...	M. 20	Early	40	122	110
Noongaar	P. 1769	Very early ...	40	88	85
Patriot	P. 1463	Early	40	81	96
Ranee	P. 1697	Late midseason ...	38	92	78
(Toby's Tusk x Gluyas Early)	C. 51	Early	39	81	87
Waratah	P. 1627	Midseason	40	99	97

COMPARATIVE PERCENTAGE YIELDS OF WHEAT VARIETIES PLANTED FOR TWO OR MORE YEARS.

Grain—Gluyas Early = 100 per cent. yield.

Variety.	Reg. No.	Comparative Percentage Yield.				Average.
		1925.	1926.	1927.	1928.	
(Dindiloa x Nabawa)	M. 28	...	...	97	81	89
(Dindiloa x Nabawa)	M. 30	...	...	91	101	96
(Federation x Bunyip) ...	M. 18	93	25*	86	79	86
(Florence x Carrabin)	M. 24	...	...	88	72	80
(Florence x Fortune)	M. 32	...	...	93	96	94
(Gluyas Early x Nabawa) ...	M. 31	...	...	91	101	96
(Nabawa x Bunyip)	M. 14	60	81	82	96	80
Patriot	P. 1463	...	...	98	81	90
Ranee	P. 1697	...	...	83	92	87
Waratah	P. 1627	...	99	91	99	96

* Badly affected by Septoria, not included in average results.

Hay—Gluyas Early = 100 per cent. yield.

Variety.	Reg. No.	Comparative Percentage Yield.				Average.
		1925.	1926.	1927.	1928.	
(Dindiloa x Nabawa)	M. 28	...	...	83	81	82
(Dindiloa x Nabawa)	M. 30	...	...	97	99	98
(Federation x Bunyip) ...	M. 18	85	85	77	74	80
(Florence x Carrabin)	M. 24	...	...	83	84	84
(Florence x Fortune)	M. 32	...	...	87	106	96
(Gluyas Early x Nabawa) ...	M. 31	...	...	93	84	88
(Nabawa x Bunyip)	M. 14	67	88	79	86	80
Patriot	P. 1463	...	...	93	96	94
Ranee	P. 1697	...	...	81	78	80
Waratah	P. 1627	...	113	99	97	103

SUMMARY OF RESULTS WITH OAT VARIETIES.

Variety.	Reg. No.	Season of Maturity.	Average height in inches.	Percentage Yields.	
				Grain.	Hay.
(Algerian x Ruakura)	C. 93	Late	25	28	51
(Algerian x Sunrise)	C. 72	Late	28	39	93
Belar	P. 1740	Late	28	72	84
Buddah	P. 1632	Early	34	94	92
Burts Early	P. 1494	Early	34	100	100
Gidgee-	P. 1737	Early	34	96	97
Guyra	P. 1250	Midseason	28	81	88
(Lachlan x Sunrise)	C. 87	Late	20	39	...
Mulga	P. 1185	Early	36	115	107
Palestine	P. 1716	Early	33	127	80
Unnamed	P. 1724	Early	35	111	108

NOTE.—Palestine made about normal growth—all other varieties very stunted.

POTATO TRIALS AT BUREKUP, 1928.

G. N. Lowe,

Senior Potato Inspector.

Experiments in potato fertilisers and in seed potatoes were conducted recently by the Department of Agriculture on the property of Mr. C. L. Clarke, at Burekup. These trials were undertaken on similar lines to those which have been carried out in former years in the same area. In the fertiliser trials varying quantities of either nitrogen, phosphoric acid or potash were used in comparison with a standard control mixture. This control mixture consisting of 1,430 lbs. Super, 500 lbs. Sulphate of Ammonia, and 210 lbs. Sulphate of Potash per acre has been used in many experiments, because it offers a starting point for the variations of plant food under consideration. In these trials, moreover, it proved one of the most successful of the manures used. This mixture supplies to the soil in actual plant food 300lbs. of Phosphoric Acid; 100lbs. Nitrogen and 100 lbs. Potash. For practical purposes it could be regarded as a mixture of 14 cwt. Super, 5 cwt. Sulphate Ammonia and 2 cwt. Sulphate Potash. The results obtained from these field trials should be of interest to potato growers in this and in other areas.

Land similar to that in which the trials were carried out is very common in many parts of the South-Western area. It is typical of that usually found in cleared Red Gum and Jarrah districts, and consists of a very light red sandy loam. This particular area had been under cultivation for potatoes and was down in Subterranean Clover pasture for some years. During the year prior to experiment the paddock was pastured.

The seed used for planting was certified seed, obtained from Mr. F. Tonkin, of Young's Siding, in the Albany district. For some while this Department has advocated the use of seed from the Southern district for planting in the South-Western areas. This seed, which is grown in the cooler parts of the State, seems to be less affected with mosaic and other virus troubles than seed from the South-Western district. This practice of bringing seed from a cooler district is general in many of the potato areas in other parts of the world. It was justified in this particular instance, for the general average of the plots was approximately seven tons per acre, whilst the yield of the rest of the paddock, which was not planted with either Southern or Certified Seed, was only three tons per acre. The Certified Seed was shapely and of fair size and the tubers were cut into 2oz. sets, treated by the wet bag method and then planted.

In addition to the fertiliser trial, a seed experiment was conducted.

In this test twelve plots were taken and in six of them the seed was planted straight off knife, and in the other six the seed was treated with the wet bag process. A difference of five cwt. per acre in favour of the treated

seed was noted. This would show that even in winter planting, when the ground is quite wet, it pays to treat cut seed with the wet bag treatment. The additional time occupied in preparing the seed is, therefore, adequately repaid by the extra crop of potatoes obtained. The actual results obtained were 6 tons 16 cwt. 3 qrs. 6 lbs. per acre from the treated and 6 tons 11cwt. 2 qrs. 10 lbs. from the untreated.

The experimental area was ploughed about 5 inches, the sets placed about 3½ inches below the surface, and the fertiliser was applied in the

Showing the vigorous type of plant from Certified Seed in the Burekup Fertiliser Trial.

furrows. The planting was finished on 11th July. The subsequent cultivation consisted of two cultivations on the flat, then the potatoes were hilled and hoed twice. During the early growing period the weather was very cold and wet and consequently the crop was slow in making growth. A great deal of damage was also done by the red-legged earth mite, which was very prevalent, owing to the weather conditions. An attempt was made to combat this pest by laying flaked napthaline at the rate of 1 cwt. per acre along

the rows with a fair measure of success. In view of the prevalence of Irish Blight in the metropolitan area, it was deemed advisable to spray with a commercial preparation of Bordeaux mixture (in powder form) towards the end of the growing period. The crop was finally dug 27th November.

In the Potash Series the variations used were 415 lbs., 210 lbs., and 0 lbs. per acre. From the table given below, it will be seen that the highest yield, viz., 7 tons 5 cwt., was obtained from the plot containing the greatest amount of potash per acre. This is rather interesting, for there is an idea prevalent throughout the potato growing areas that it is not necessary to

The type of plant grown in the paddock surrounding the Burekup Fertiliser Trial and planted at the same time. Mosaic infection is general now in this old strain of local seed.

add potash to the fertiliser. In the trial, a difference of £1 9s. per acre in the cost of manure due to the extra potash above that of the control mixtures gives an increase of 6 cwt. of potatoes per acre. If we assume the average price of potatoes grown at this time of the year to be £10 per ton, a profit of about £1 10s. per acre is obtained. A reference to the table shows that

there was a graded increase in yield as the potash was increased from 0lbs. to 415 lbs. per acre.

Manure used per Acre.	Amount of Potash in lbs. per Acre.	*Cost per Acre.	Yield per Acre.
		£ s. d.	T. C. Q. L.
415lbs. Sulphate Potash ... 500lbs. Sulphate Ammonia ... 1,430lbs. Super	200	11 4 11	7 5 2 22
210lbs. Sulphate Potash ... 500lbs. Sulphate Ammonia ... 1,430lbs. Super	100	9 15 11	6 18 1 16
0lbs. Sulphate Potash ... 500lbs. Sulphate Ammonia ... 1,430lbs. Super	1	8 5 11	6 13 0 20

*The cost per acre was worked out on the basis of £16 per ton for Sulphate Potash, £6 per ton for Super and £20 per ton for Sulphate of Ammonia. This is the current market rate, *ex* Perth.

The difference noted in the nitrogen series would seem to indicate that no great benefit is derived from increasing the weight of the Sulphate of Ammonia from 200 lbs. to 500 lbs. per acre, though the highest yield was obtained from the plot containing the greatest amount of Sulphate of Ammonia.

Manure used per Acre.	Amount of Nitrogen in lbs. per Acre.	Cost per Acre.	Yield per Acre.
		£ s. d.	T. C. Q. L.
500lbs. Sulphate Ammonia ... 210lbs. Sulphate Potash ... 1,430lbs. Super	100	9 15 11	6 16 2 12
350lbs. Sulphate Ammonia ... 210lbs. Sulphate Potash ... 1,430lbs. Super	70	8 9 2	6 7 0 26
200lbs. Sulphate Ammonia ... 210lbs. Sulphate Potash ... 1,430lbs. Super	40	6 17 11	6 14 2 2

On the other hand, some of the evidence seems to show that 500 lbs. of Sulphate of Ammonia is somewhere in the neighbourhood of the right amount. The highest yield was that derived from the mixture containing 500 lbs. Sulphate of Ammonia, 1,430 lbs. Super. and 415 lbs. Sulphate Potash. The result obtained from this mixture can be compared with that from a similar mixture containing only 200 lbs. Sulphate of Ammonia. It would seem that for an expenditure of £2 18s in Sulphate of

Ammonia a return of about 12 cwt. of potatoes per acre is obtained. On the £10 basis for potatoes, this is a profit of £3 per acre.

Manure used per Acre.	Amount of Nitrogen in lbs. per Acre.	Cost per Acre.	Yield per Acre.
		£ s. d.	T. C. Q. L.
500lbs. Sulphate Ammonia ...	100	11 4 11	7 5 2 22
1,430lbs. Super			
415lbs. Sulphate Potash ...			
200lbs. Sulphate Ammonia ...	40	8 6 11	6 14 0 8
1,430lbs. Super			
415lbs. Sulphate Potash ...			

A study of the results given below for the super trials shows that an increase of super. in the mixture from 1,430 lbs. to 1,907 lbs. per acre did not increase the yield. This result would seem to run contrary to the opinion held by many growers, who maintain that an increase in super. means an increase of yield.

Manure used per Acre.	Amount of Phosphoric Acid in lbs. per Acre.	Cost per Acre.	Yield per Acre.
		£ s. d.	T, C. Q. L.
1,907lbs. Super	400	11 1 5	6 13 0 20
500lbs. Sulphate Ammonia ...			
210lbs. Sulphate Potash ...			
1,668lbs. Super	350	10 8 7	6 6 3 4
500lbs. Sulphate Ammonia ...			
210lbs. Sulphate Potash ...			
1,430lbs. Super	300	9 15 11	6 19 2 21
500lbs. Sulphate Ammonia ...			
210lbs. Sulphate Potash ...			

A detailed account of the manures used, the yield per acre, and cost per acre is given in the diagram accompanying this article.

Summary.

1. Certified Seed is a payable proposition for potato growers.

2. When seed potatoes have to be cut before planting, it is better to treat them with the "Wet Bag" method.

3. The best result was obtained from a mixture containing 415 lbs. Sulphate of Potash, 1,430 lbs. Super. and 500 lbs. Sulphate of Ammonia.

POTATO FERTILISER EXPERIMENT. JULY-NOVEMBER 1928 at BUREKUP

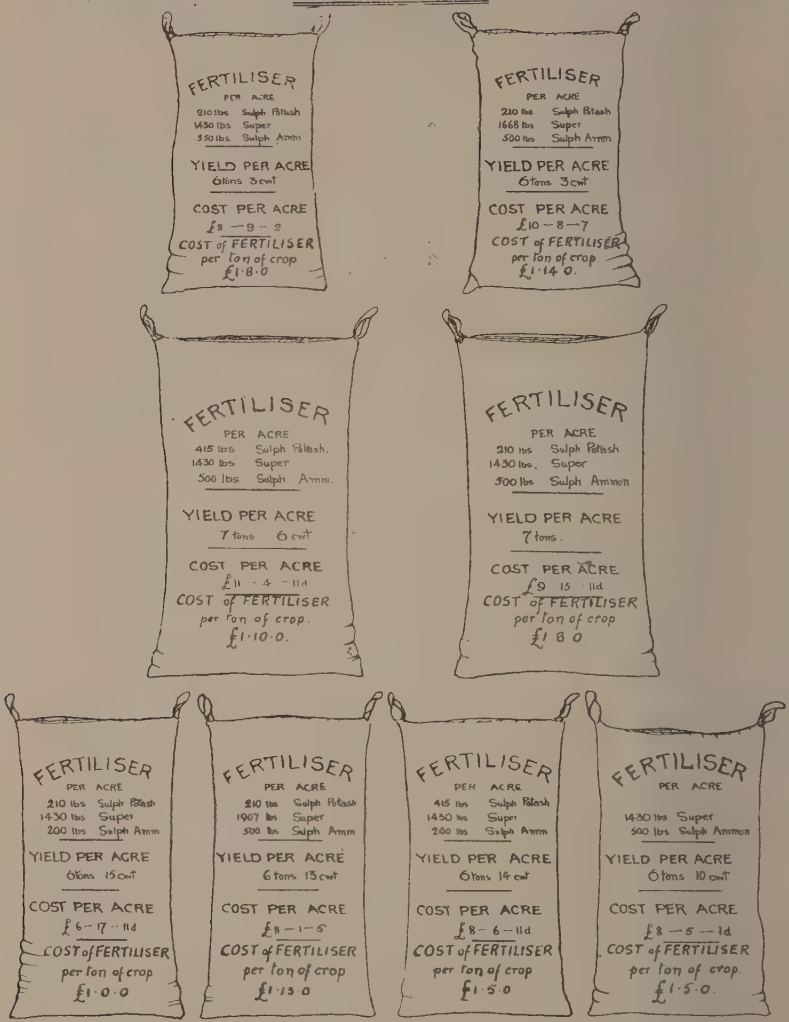


Chart showing fertilisers + composition, yield per acre, + cost of fertiliser per ton of crop

PRODUCTION AND CONSERVATION OF FODDER.*

P. G. Hampshire,
Superintendent of Dairying.

In discussing this subject, and there is not the slightest doubt that it is of the utmost importance to the Australian dairying industry, it must be borne in mind that conditions regarding production and conservation of fodder would vary in different parts of Australia.

Whilst much could be done through the Dairy Organisations of Australia in the direction of financing in regard to better bulls, it is difficult to suggest any scheme of finance which would enable the farmer to be financed in regard to the storage of fodder on his holding. Any system of storage or conservation of fodder other than on his own holding would not be practicable, although in concentrated dairying districts a system of conserving fodder in the shape of silage in overhead silos may be possible, but there are many features which would militate against the easy working and success. It would seem, then, that the question of adequate supply of fodder for the dairy herds of Australia throughout the dry and the drought periods must be, more or less, dealt with individually, and local conditions of soil, climate, and suitability of crops or pastures must be taken into consideration. The subject, therefore, can only be taken on broad principles, and I offer for discussion the following:—

PRODUCTION.

The production of forage for dairy herds would come under three headings:—

1. Pasture.
2. Supplementary Fodder Crops.
3. Concentrated Foods.

Pasture.—There is no doubt that this form of production of fodder for dairy cows ranks highest, in view of the economy of production, elimination of labour costs and suitability of the fodder for dairy cows. Ideal pastures, however, are governed by climate and soil, and suffer during dry and drought periods.

Apart from the improvement of pastures by proper care and management, such as small paddocks, constant changes, harrowing down animal manure, *under-* rather than over-stocking, there is the very important factor of improving pastures by top-dressing at least annually with phosphatic fertilisers. This form of increased fodder production is one that of recent years shows the greatest economic return.

Top-dressing with superphosphate over a period of four years on 65 areas in different centres of Western Australia shows an average increase as follows:—No manure, 100%: 1 cwt. superphosphate per acre, 263%; 2 cwt. superphosphate per acre, 330%; and still further the "quality" of pastures has been improved by the addition of leguminous plants as the result of the use of phosphatic manures to the following extent:—No manure, 100%; 1 cwt. superphosphate, 260%; 2 cwt. superphosphate 300%.

* Notes prepared for discussion at Meeting of Australian Dairy Council, Melbourne, 27th February, 1929.

Supplementary Fodder Crops.—Under this heading, crops such as:—(a) Clovers; (b) Lucerne; (c) Maize; (d) Sorghum; (e) Millets; (f) Sudan Grass; (g) Tangier Pea.

On almost all classes of country under varying climatic conditions, crops could be selected from the above-mentioned to grow at various periods of the year to supplement the pastures.

It is believed that the need of conservation of fodder would be minimised to a great extent if supplementary fodder crops were properly grown and formed part of the recognised operations of the farmer in the feeding of his herd, and it is felt that in this respect, the greatest amount of work can be done, particularly with the small dairy farmer, in meeting the dry periods of the year and times of drought.

In the consideration of supplementary fodder crops for summer and winter feeding the following are recommended:—

Summer Feeding.—Meadow Hay (dry); Clover Hay (dry); Lucerne (green); Millet (green); Sudan Grass (green); Maize (green); Sorghums (green); Tangier Pea (green).

Winter Feeding.—Lucerne Hay (dry); Clover Hay (dry); Meadow Hay (dry); Oaten Hay (dry); Pea Hay (dry); Sorghum (green), late cuttings; Barley (green); Berseem Clover (green); Oats (green).

Concentrated Foods.—The principal of these are Bran, Crushed Oats, and Linseed Meal.

There is a distinct disadvantage in regard to concentrated foodstuffs, inasmuch as, on the majority of dairy farms, they cannot be produced. Oats, however, is a crop that can be grown almost generally, and oat grain when crushed forms a concentrated food almost parallel with bran for feeding cows, and where fed with clover hay and green maize or sorghum forms an economical and suitable ration for a dairy cow.

Other concentrated foodstuffs are not dealt with in view of the fact that the majority of them must be purchased.

CONSERVATION.

The conservation of fodder would come under two principal headings:—

1. Hay.
2. Silage.

Hay.—Lucerne; Meadow; Clover; Oaten; Wheaten; Pea.

Silage.—Maize; Sorghum; Oats and Peas; Oats; Wheat.

Forms of Silage.—Stack; Trench; Pit; and Overhead, or Tub.

In regard to the conservation of fodder crops, there is no doubt that the simplest forms of conservation are in the shape of conserving crops as hay, and on almost any dairy farm different types of hay may be made. Hay, however, has one distinct disadvantage from the point of view of feeding the dairy cow inasmuch as it lacks succulence. As feed during the winter and as part ration when fed with silage, it is, however, very valuable. Silage, on the other hand, is probably the most economical and most suitable form of roughage that can be stored for dairy cattle. Almost all types of country will grow crops that are suitable for silage, whether they be winter or summer

crops. Silage has the great advantage that it may be stored in large quantities close to the place of feeding; it is free from damage by vermin; and it will not burn or deteriorate through keeping if properly made.

The different ways in which silage can be made also enable the dairy farmer with different types of country and limited means to avail himself of this "greatest insurance" he can have against drought and dry periods.

It must be borne in mind, however, that in the case of the stack and trench silos, the losses in the material ensiled are considerable, especially in stack silage.

According to the material made into a stack, the losses will vary from 30 to 35 per cent. and even greater where the stack is badly made and the material not cut at the right time. However, as so often happens in the dairying districts of Australia, there are periods when there is an abundance of feed when, if the farmer were to take advantage of those periods of abundance and cut and stack, the losses of the material in the stack would be a mere bagatelle compared with the losses in condition and milk yield which occur in his herd through lack of succulent feed in times of dry periods and drought.

A trench silo is only suitable in country which does not seep, and is built on the principle of the construction of a dam for water. Beyond the expense incurred in excavating the soil to form the trench, the cost is very small, especially where the farmer does his own excavation.

In regard to the pit silo, this type is not recommended in view of the fact that the cost of construction is proportionately nearly that of an overhead silo where permanence is desired, and it has the great disadvantage that all the material in the silo must be lifted each day when it is being fed to the herd. Anyone who has to feed silage to a large herd of, say, 70 to 100 cows from this type of silo will appreciate that the hoisting of upwards of one ton of material daily is by no means an easy task. The pit silo has one great advantage, and that is it does not require an elevator to lift the material when filling, but as the chaff-cutting machine for silage purposes is usually fitted with a blower or elevator, this is not a very big consideration.

It is essential that pit silage should be chaffed small, as otherwise the emptying of the pit in the case of long material becomes a very strenuous and difficult task owing to it becoming so densely matted. In the case of the stack and trench silage, the material is not chaffed but can be more readily cut out with special knives in a "face" than is the case with a pit silo.

The overhead or tub silo takes many forms of construction, such as concrete, brick, stone, iron, fibro-cement, or wood. The principal factors, however, to ensure success are that the material used must be impervious to the air, should be circular—free from any corners or corrugations on the inside, and at least two feet high for each foot in diameter, with provision for doors at frequent intervals to provide for economy of emptying. Where a farmer can arrange for the erection of this type of silo or silos, placing them at or adjoining the bails, it presents the most efficient and economical form of feeding dairy stock where conservation must be practised.

The value of silos on dairy farms, particularly as a part of the equipment of the holding, has not been thoroughly appreciated by farmers and especially by banking institutions when considering loans to their clients to develop their holdings. It forms the soundest and best possible security to the banker on a holding, as it guarantees that the stock carried on the holding

will not depreciate at any period of the year through lack of feed, and if the losses which occur annually in Australia through the lack of feed were totalled in pounds, shillings and pence, it is believed that a sufficiently large sum of money would be available to finance the erection of a silo on almost every dairy farm. Apart from the fact that many dairy farmers do not sufficiently appreciate the advantages of the conservation of fodder as silage and a silo on every farm, it is felt that the bankers of Australia might with considerable advantage be asked to meet the dairy organisations with the view of discussing this very important phase of stabilising the dairying industry in Australia.

Bulletins Nos. 208 and 184—"Pastures"; 216—"Fodder Crops"; and 211—"Silage: Ensilage and Silos" are available.

LUCERNE AND MAIZE.

It is felt that a realisation of the great value of these two fodder crops is not fully appreciated by the average dairyman. Lucerne and maize rank highest of all fodder crops in supplementing pastures during the summer

Lucerne,
grown at Brunswick, providing six to seven cuts per annum.

months. Both provide bulk of feed and succulence and grow during the period when the pastures are drying up, and, when fed together at the ratio of 11b. of lucerne to 6lbs. of maize, a reasonably balanced ration is obtained. There are very few farms in the South-West that will not grow these two crops if proper preparation and cultivation of the soil are observed.

It is generally recognised that lucerne requires a deep soil with a good well drained subsoil. That, however, this crop will do well in soils that are shallow and do not have first-class subsoils has been proved over and over again. At the Denmark State Farm a 3-acre stand of lucerne was maintained for seven years on soil that was only nine inches above stiff clay.

The main feature in securing success in the growing of this crop, as well as maize, is the thorough preparation of the seed bed obtaining a well worked up condition of the soil with a good tilth and freedom from weed seeds. The growing of intense crops, such as potatoes, prior to the sowing of lucerne or maize is of great value.

Both lucerne and maize do best on deep alluvial land which retains moisture in the summer, but very good crops may be obtained on the higher lands where proper conditions of fallowing are resorted to, where the soil is well prepared, and where intertillage during the growing of the crop is practised. This latter aspect, namely, the cultivation of the ground at 10-day intervals during the growth of the crop until it reaches a height of three or four feet, is of the greatest importance in retaining moisture in the soil which has been conserved by fallowing through the winter.

Maize,
grown at Denmark, averaged 22 tons 16 cwt. per acre.

The utilisation of all farmyard manure on land where maize is to be grown is very important in obtaining good yields.

It is particularly desired to bring under the notice of dairymen the value of lucerne and maize as the main crops to be grown in their farming operations in supplying supplementary crops for their pastures to keep the herd of dairy cows yielding at their maximum throughout their lactation.

Bulletins No. 148—"Maize," and No. 149—"Lucerne," prepared by the Director of Agriculture (Mr. G. L. Sutton) are available free to all people desiring the fullest information relative to the growing of these crops.

SUBTERRANEAN CLOVER STACK SILAGE.

Recognising that a considerable amount of highly nutritious succulent fodder is grown on the average farm in the South-West of the State in subterranean clover pastures, which in the ordinary course of events is not wholly eaten by the stock owing to the abundance of the growth during September to November, certain thinking dairymen have appreciated the value of cutting this crop in its green state and making stack silage. Pioneers of this method in the State are—Messrs. Bailey Bros., of Denmark; G. Combs, S. Gray, and H. Grumpelt, Manjimup; and during the season just ended a con-

Subterranean Clover Stack Silage.
One of four stacks at Bailey Bros.' Farm, Denmark.

siderable number of the small farmers, including a number of group settlers, have built stacks of silage from subterranean clover. The success that has attained through their efforts has been varied. On 11 stacks recently examined, the losses of the material in the stacks vary from 20½ to 90 per cent., and the average of the 11 stacks inspected showed a loss of 54 per cent. of the material ensiled. Whilst recognising that this loss is particularly high and can be avoided by resorting to better methods and larger stacks, there is no doubt whatever that, with the abundance of fodder that is available during October and November, any cheap method which will provide for its conservation to feed in its green succulent form during the summer months is of outstanding advantage. The writer does not at this stage propose to dogmatise in regard to the methods that should be resorted to in order to avoid the losses that are occurring, but hopes to do so at a later date and before the next Subterranean Clover season.

There are many advantages of cutting these prolific Subterranean Clover pastures and making them into silage where this is done early in the growing season, namely:—

1. A hay crop can still be obtained towards the end of the season.
2. Pastures cut for silage at the end of September or early in October in good districts under favourable conditions, and where top-dressing is practised, will provide a very good cut at the end of November or early in December.
3. The re-growth of weeds and of noxious plants is checked.
4. A better quality hay is obtained, and additionally the hay is ready for harvesting at a later period of the year when there is less likelihood of showers—the worry of the haymaker.

LIVE STOCK AND MEAT.

For the information of readers of the "Journal," the following particulars have been supplied by Messrs. Elder, Smith & Co., Limited, Perth:—

COMPARATIVE YARDINGS OF STOCK YARDED AT METROPOLITAN FAT STOCK MARKETS FOR DECEMBER, 1928, JANUARY AND FEBRUARY, 1929.

	December, 1928.			January, 1929.					February, 1929.			
	5.	12.	19.	2.	9.	16.	23.	30.	6.	13.	20.	27.
Sheep and Lambs	20,317	14,635	24,714	15,597	11,094	10,405	14,004	11,273	10,574	10,994	9,811	11,396
Cattle ...	706	566	929	612	546	642	529	622	362	462	530	488
Pigs ...	379	745	929	310	655	661	558	617	620	669	751	711

COMPARATIVE VALUES PER LB. OF STOCK SOLD AT METROPOLITAN FAT STOCK MARKETS DURING DECEMBER, 1928, JANUARY AND FEBRUARY, 1929.

	December, 1928.			January, 1929.					February, 1929.			
	5.	12.	19.	2.	9.	16.	23.	30.	6.	13.	20.	27.
Mutton ...	6¾	6¾	6¾	6¾	7½	7¼	7½	7¼	7¼	7¼	7½	7½
Beef ...	7½	8¼	8½	9	9	8¾	8	7¾	8½	9	9½	9¾
Pork ...	12	12½	12½	13	13	12	12	11½	11½	11½	11½	11½
Bacon ...	10	10	10	10	10	9¾	9¼	9	9¼	9¾	10	10

LUCERNE CROPS AT COLLIE.

Irrigated Lucerne crops grown at the Amalgamated Collieries, Limited, Mine, Collie, and the plots are situated adjacent to the mine stables and irrigated from the mine. Sown in 1927 (September), the first crop is said to have been cut in November of that year, when 18 inches high. These photos. show respectively the second and third crops taken off this year, and are stated at 3 feet 6 inches and 3 feet 9 inches respectively.

Photos. and information supplied by H. Woodward, Collie.

VARIETAL BUNT RESISTANCE TESTS—1928.

E. J. LIMBOURN,
Seedsman, Experiment Farm, Merredin.

As in the case of the Varietal Flag Smut Resistance test, this experiment was carried out with the object of obtaining definite information regarding the resistance of wheat varieties to the attacks of Bunt. This experiment is in continuance of those carried out in previous years and since 1921.

The method of infection was similar to previous years. Sufficient seed, according to the requirements of each variety, was placed in separate packets together with a quantity of Bunt spores obtained by crushing the Bunt balls. These were well shaken up until the wheat seeds were completely covered, the Bunt spores adhering to the grain, especially in the crease and at its brush end.

Planting was delayed until early in June, for the following reasons:—

1. To ensure a fairly regular germination of all varieties after sufficient rain had fallen to obviate any possibility of malting.
2. To ensure as far as possible that soil temperature should be equally suitable for the germination of both the wheat seeds and bunt spores.

The germination was fairly good, but owing to a spell of dry weather immediately following germination, early growth was very slow. A number of seedlings died, some due to the prevailing dry conditions, but the majority were destroyed by seedling rot. The slow early growth apparently gave the bunt fungus an advantage, the resulting infection of the mature plants in many cases being very heavy.

To determine the extent to which each variety became infected, each plant was examined at maturity for the presence of the disease and the infected plants cut back, leaving about one foot of the stalk standing. Badly infected plants are quite readily identified at any time after the flowering stage, the plants being of a darker colour than normal plants and the ears having a very swollen appearance. In more resistant varieties it often happens that only a few balls of the bunt will form on the whole plant, which under test row conditions may have anything up to 10 or 15 ears, and it requires very close observation to detect these. Usually in such varieties the infection occurs in late or secondary growth, so that care was taken to examine such growth first. Having determined and cut back all the infected plants, the number of the clean and bunted plants in each row was recorded.

For purposes of this experiment, a plant is said to be infected whether the whole plant produces bunt balls or whether there is only one ball of bunt on the whole plant. It has been noticed, however, both with the disease and with Flag Smut, that the higher the percentage of infection per variety, so in proportion is the infection per plant. With Bunt, it has also been found that a variety which is highly resistant under normal conditions becomes infected to a greater extent when it receives a check to its growth as the result of less favourable growing conditions or for other reasons. On the other hand, from observations made this year, it would seem that in the case of very susceptible varieties the effect of infection was to stimulate the growth of the infected plants, for it was found that in such cases the plants

without infection were comparatively weakly. The growth of such comparatively weakly plants must, however, be regarded as quite normal when compared with the growth of normally clean plants grown from clean seed. Possibly the increased growth of the infected plants in the case of the susceptible varieties is due to a special attempt on the part of the plant to reproduce itself.

In that portion of the test in which the resistant varieties were planted, the percentage of infection of the control variety "Booran" was 46 compared with a percentage of infection of 89 in the remainder of the trial. The lessened infection of the control variety indicates that the rate of infection was favourably influenced by some factor, possibly the soil conditions, and in consequence the results with these varieties may not be normal. The results are given below:—

TABLE I.

BUNT RESISTANCE TESTS, 1928.

Variation in resistance of Varieties as shown by their Percentage of Infection when compared with a very susceptible variety—"Booran."

Name.	Reg. No.	Infection per row.	Comparative Infection.	Name.	Reg. No.	Infection. per row.	Comparative Infection.
		%	%			%	%
Booran	P 1434	46	100	Booran	P 1434	95	100
Genoa	P 1511	0	0	Bathurst ...	P 220	88	96
Florence	P 223	0	0	Bayah	P 229	66	73
Dindiloa	P 1438	0	0	Bunge No. 1 ...	P 1447	96	107
(Dindiloa x Nabawa)	C 80	0	0	(Bunge No. 1 x I. P. 9)	P 1450	84	93
S.H.J.	P 1445	0	0	Canaan	P 913	81	90
Booran	P 1434	48	100	Booran	P 1434	85	100
Booran	P 1434	47	100	Booran	P 1434	96	100
(Huguenot x Indian 5)	C 65	8	18	Cleveland ...	P 1508	93	103
(Florence x Carrabin)	C 77	0	0	(Currawa x Minister)	P 1,752	88	98
(Florence x Nabawa)	C 81	2	4	Currimp (I.) ...	P 1,747	81	90
(Quality x Velvet Don)	C 86	0	0	Currimp (II.) ...	P 1.747	85	94
Ford	P 915	4	9	Daphne	P 1,193	80	90
Booran	P 1434	43	100	Booran	P 1,434	83	100
Booran	P 1434	92	100	Booran	P 1.434	63	100
Amby	P 1446	77	87	Fane	P 1.191	73	84
Anvil	P 1195	73	83	(Federation x 1878 P. 17)	P 1.755	91	105
Austral	P 1325	89	100	Ghurka	P 1.713	45	52
Babakin	P 1715	53	60	Golden King ...	P 1.429	88	100
Bald Knob ...	P 1184	40	45	Golden Return ...	P 1.535	78	90
Booran	P 1434	85	100	Booran	P 1.434	92	100
Booran	P 1434	92	100	Booran	P 1.434	96	100
Hiawatha ...	P 1458	96	109	Piastre	P 1.460	4	4
Indian Pusa 4 ...	P 1459	61	69	Wallace	P 1.383	90	98
Leaks Rustproof	P 1528	92	105	White Tuscan ...	P 1.516	92	100
Lilydale	P 1721	87	99	Yandilla	P 392	58	63
Mac's White ...	P 833	74	84	Yanward ...	P 984	71	77
Booran	P 1434	84	100	Booran	P 1.434	87	100
Booran	P 1434	84	100				
Minflor II. ...	P 1753	0	0				
(Minister x Bald E. II.)	P 1745	82	92				
Nabob	P 1705	40	45				
Noble's Early ...	P 1428	68	76				
Nullah	P 821	87	98				
Booran	P 1434	96	100				

TABLE II.

BUNT RESISTANCE TESTS, 1928.

Varieties arranged according to their comparative Percentage of Infection.

Control Variety: Booran P1434 = 100%

Resistant. 0 to 25%		Susceptible. 26 to 75%		Very Susceptible. 76 to 100% and over.			
	%		%		%		%
Dindiloa	0	Bald Knob ...	45	Noble's Early ...	76	Nullah	98
Florence	0	Nabob	45	Yanward	77	Wallace	98
Genoa	0	Ghurka	52	Anvil	83	Lilydale	99
Minflor (Type II.)	0	Babikin	60	Fane	84	Austral	100
S.H.J.	0	Yandilla	63	Mac's White ...	84	Booran (Control) ...	100
Piastre	4	Indian Pusa 4 ...	69	Amby	87	Golden King ...	100
Ford	9	Bayah	73	Currimp (Type I.)	90	White Tuscan ...	100
				Canaan	90	Cleveland	103
				Golden Return ...	90	Leak's Rustproof ...	105
				Daphne	90	Bunge No. 1 ...	107
				Currimp (Type II.)	94	Hiawatha	109
				Bathurst	98		

TABLE III.

Unnamed Crossbreds arranged according to the comparative Percentage of Infection.

Control Variety: Booran P1434 = 100%

Resistant. 0 to 25%		Very Susceptible. 76 to 100% and over.	
	%		%
(Dindiloa x Nabawa), C80	0	(Minister x Bald Early) (Type II.), P1745 ...	92
(Florence x Carrabin), C77	0	(Bunge No. 1 x Indian Pusa 9), P1450 ...	93
(Quality x Velvet Don), C86	0	(Currawa x Minister), P1752	98
(Florence x Nabawa), C81	0	(Federation x 1878 P17), P1755	105
(Huguenot x Indian 5), C65	0		

Since the varietal resistance test was commenced in 1921, 153 named varieties of wheat have been tested. Of these, only one variety—"Genoa" (P. 1511)—has proved fully resistant during each year it has been tested, and therefore can be considered immune from the disease. Three other varieties—"Dindiloa" (P. 1437), "Florence" (P. 223), and "S.H.J." (P. 1445)—have been highly resistant, showing infection only under adverse conditions and in a very light form. The "Durum," or macaroni, varieties also show high resistance; those tested—"Covelle" (P. 1433), "Dauno" (P. 1544), "Huguenot" (P. 1366), "Kubanka" (P. 1211), and "Sarragolla" (P. 158)—all having a comparatively low percentage of infection.

"Carrabin" (P. 1437) has also shown high resistance under normal conditions and was at first considered a resistant variety. Continued tests have shown, however, that under certain conditions it is susceptible to the disease, although only to a small extent. The infection is seldom found in the primary growth, being confined to the secondary or late growth. In tables IV. and V. will be found the results of this test, showing the actual percentage of infection each season since its commencement. The first year, 1921, the results were very unsatisfactory, due to the method of planting. For that year the planting was carried out, as with clean seed, according to the period of maturity of the variety. Since then, however, the whole of the experiment has been planted at one time, planting being delayed until after a good fall of rain.

TABLE IV.

BUNT RESISTANCE TESTS.

Yearly results of varietal resistance as shown by Percentage of Infection.

From 1921 to 1928.

Name.	Reg. No.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	Average.	Highest Percentage Infection.
		%	%	%	%	%	%	%	%	%	%
Alliance	P1700	...	...	...	...	...	...	65	...	65	65
Alpha	P 361	...	96	32	...	...	...	...	...	64	96
Amby	P1446	...	...	...	...	...	...	...	77	77	77
Anvil	P1195	...	...	...	...	...	...	...	73	73	73
Aussie	P1785	...	...	...	...	...	...	45	...	45	45
Austan	P1276	...	...	44	65	45	...	...	...	51	65
Austral	P1325	...	...	...	...	...	...	...	89	89	89
Avoca	P 674	...	87	48	...	...	...	...	...	67	87
Babakin	P1715	...	...	...	...	16	...	...	53	34	53
Bald Early ...	P 986	...	...	44	70	39	82	...	89	65	89
Bald Knob ...	P1184	...	...	...	...	...	...	...	40	40	40
Baroota Wonder Early	P 859	33	69	31	64	41	...	...	...	48	64
Barwang	P1536	...	...	...	...	...	84	...	...	84	84
Bathurst	P 220	...	...	...	...	...	...	...	88	88	88
Bayah	P 229	...	...	...	...	...	...	...	66	66	66
Belka	P1443	5	72	24	...	...	...	...	...	33	72
Bena	P1614	...	...	...	...	31	71	61	...	54	71
Binya	P1789	...	...	...	...	...	...	65	...	65	65
Bobin	P1726	...	...	...	...	...	...	53	...	53	53
Boolaroo	P1727	...	...	...	...	...	...	35	...	35	35
Boonoo	P1736	...	...	...	...	...	...	50	...	50	50
Booran	P1434	...	85	70	80	70	82	78	77	77	85
Bowes (C49) ...	P1804	...	...	...	...	20	71	51	...	47	71
Bredbo	P1775	...	...	...	...	...	...	56	...	56	56
Bruce	P1790	...	...	...	...	...	...	...	...	57	57
Bunge No. 1 ...	P1447	...	...	...	...	...	...	...	96	96	96
Bunyip	P 421	...	58	28	...	...	...	...	...	43	58
Cadia	P1728	...	...	...	...	...	...	74	...	74	74
Caliph	P 914	6	93	24	61	19	68	...	...	47	93
Canaan	P 913	...	...	...	...	...	...	...	81	81	81
Canberra	P 709	...	90	42	59	28	72	...	...	58	90
Canimbla	P1729	...	...	...	...	...	...	56	...	56	56
Capitol	P1698	...	...	...	...	...	...	74	...	74	74
Carrabin	P1437	0	5	0	3	30	58	25	15	17	58
Cargo	P1788	...	...	...	...	...	...	53	...	53	53
Clarendon ...	P1507	...	...	34	59	32	81	...	...	51	81
Cleveland	P1508	...	...	...	...	...	...	...	93	93	93
Clubhead	P 371	...	89	...	...	...	...	...	...	89	89
Comeback ...	P 228	4	62	8	57	64	80	...	...	46	80
Confederation ...	P1696	...	...	...	...	...	79	76	...	77	79
Covelle	P1433	0	0	3	...	...	...	...	...	1	3
Crossbred No. 12 ...	P1601	...	...	28	...	...	...	...	...	28	28
Crossbred No. 78a	P1602	...	...	48	...	...	...	...	...	48	48
Cuballing	P1444	...	76	23	...	26	74	...	...	50	76
Cumberland ...	P 367	...	90	24	...	...	...	...	...	67	90
Currawa	P 522	19	57	19	59	16	75	...	...	41	75
Currimp	P1747	...	...	...	...	...	...	...	81	81	81
Daphne	P1193	...	...	...	...	...	...	...	80	80	80
Dauno	P1544	...	...	6	5	27	16	...	...	13	27
Dindiloa	P1438	...	2	...	0	0	0	...	0	0·4	2
Dollar	P1776	...	...	...	...	...	...	80	...	80	80
Dookie Delta ...	P1744	...	...	...	...	...	...	24	...	24	24
Duri	P1774	...	...	...	...	...	...	43	...	43	43
Early Bird ...	P1773	...	...	...	...	...	...	57	...	57	57
Emperor	P1202	...	...	35	77	29	...	55	...	49	77
Empire	P1702	...	...	...	...	...	...	55	...	55	55
Exquisite	P1739	...	...	...	...	...	...	52	...	52	52
Fane	P1191	...	...	...	...	...	...	...	73	73	73
Federation ...	P 460	...	74	14	56	62	58	...	...	53	74
Felix	P1512	...	...	...	...	29	...	...	...	29	29
Firbank	P 225	6	80	11	...	...	...	...	...	32	80
Florence ...	P 223	0	5	0	7	3	10	...	0	4	10
Ford	P 915	...	...	...	...	...	...	...	4	4	4
Fortune	P 911	...	58	21	...	16	54	...	...	37	58
Gallipoli	P1636	...	...	...	...	21	72	54	...	49	72
Geeralying ...	P1442	...	32	0	9	12	34	...	...	17	34
Genoa	P1511	...	0	...	0	0	0	0	0	0	0
Ghurka	P1713	...	...	...	...	...	26	11	45	27	45
Gluclub (Vic.) ...	P1754	...	...	...	...	...	...	84	...	84	84
Gluclub (W.A.) ...	P1787	...	...	...	...	...	...	67	...	67	67
Gluyas Early ...	P 159	3	70	34	56	71	73	...	...	51	73
Gluyas Late ...	P1337	0	69	28	60	14	70	...	...	40	70
Golden King ...	P1429	...	...	...	...	...	...	60	88	74	88
Golden Return ...	P1535	...	...	...	...	...	...	...	78	78	78
Gresley	P1038	5	83	54	70	59	86	...	...	59	86

TABLE IV.—BUNT RESISTANCE TESTS—*continued*.

Name.	Reg. No.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	Average.	Highest Percentage Infection.
		%	%	%	%	%	%	%	%	%	%
Hamel	P 872	9	81	42	...	...	...	...	...	44	81
Hard Federation...	P 958	10	66	19	67	44	66	...	...	45	67
Hiawatha ...	P1458	...	...	...	...	...	...	...	96	96	96
Huguenot ...	P1366	...	...	8	7	0	10	...	...	6	10
Indcret	P1750	...	...	...	...	...	...	23	...	23	23
Indian Pusa 4 ...	P1459	...	...	...	...	...	...	...	61	61	61
Krithia	P1706	...	...	...	...	...	...	28	...	28	28
Kubanka	P1211	...	...	3	...	...	...	...	...	3	3
Leaks Rustproof...	P1528	...	...	...	...	...	...	...	92	92	92
Lillydale	P1721	...	...	...	...	...	...	...	87	87	87
Lotts	P1289	28	65	42	...	...	...	...	...	45	65
Macs White ...	P 833	...	...	...	...	...	...	...	74	74	74
Mahratta	P1708	...	...	...	...	...	...	35	...	35	35
Majestic	P 21	...	...	28	71	14	...	...	...	38	71
Major	P1270	17	49	35	32	72	53	...	...	43	72
Marmora	P1709	...	...	...	...	...	...	27	...	27	27
Merredin	P1440	2	63	18	68	29	48	...	...	38	68
Minister	P 834	2	0	3	12	0	22	...	...	6	22
Minlior	P1753	...	...	...	...	...	...	...	24	24	24
Minyip	P1746	...	...	...	...	...	...	31	...	31	31
Mogul	P1703	...	...	...	...	...	87	79	...	83	87
Nabawa	P1432	0	57	14	56	38	60	42	...	38	60
Nabob	P1705	...	...	...	...	...	...	11	40	25	40
Nangeenan ...	P1436	0	84	37	71	48	89	...	...	55	89
Newman's Early...	P 955	8	88	39	68	52	79	...	...	56	88
Niloc	P1277	...	90	32	52	70	67	...	...	62	90
Nizam	P1635	...	...	...	...	0	51	...	...	25	51
Nobles Early ...	P1428	...	...	...	...	...	...	...	68	68	68
Nolba (M19) ...	P1800	...	...	...	...	55	70	...	...	62	70
Noongaar (M15) ...	P1769	...	...	...	...	10	47	...	57	38	57
Nugget	P1609	...	...	...	...	...	...	76	...	76	76
Nullah	P 821	...	...	...	...	...	...	...	87	87	87
Nungarin	P1435	0	57	38	71	25	81	...	...	45	81
Ogilvie (C48) ...	P1803	...	...	...	...	10	60	48	...	39	60
Omrah	P1741	...	...	...	...	...	...	54	...	54	54
Onas ...	P1513	...	...	65	...	40	77	...	...	61	77
Parsee ...	P1701	...	...	...	...	...	81	72	...	76	81
Patriot ...	P1463	...	...	...	...	...	76	75	...	75	76
Piastre	P1460	...	...	...	...	...	...	...	4	4	4
President	P1200	...	...	30	71	36	...	...	...	46	71
Queen Fan ...	P1194	...	...	7	26	51	22	...	...	26	51
Queen's Jubilee ...	P 92	3	83	54	...	...	...	...	...	47	83
Rajah (S. Aust.)...	P1201	...	...	45	62	18	...	...	...	42	62
Rajah (Vic.) ...	P1710	...	...	...	...	...	63	61	...	62	63
Ranee	P1697	...	...	...	...	...	72	61	...	66	72
Red Russian ...	P 812	12	70	27	...	...	...	...	...	36	70
Riverina	P1786	...	...	...	...	...	...	42	...	42	42
Roseworthy ...	P1190	...	...	42	42	66	57	...	...	52	66
Sailor's Fortune ...	P 465	16	64	46	...	...	...	...	...	42	64
Sarragolla ...	P 158	...	...	0	1	...	0	...	...	0·3	1
Sepoy	P1695	...	...	...	...	...	...	38	...	38	38
S.H.J.	P1445	0	8	0	1	1	17	...	0	4	17
Soutars Early ...	P1461	...	...	7	60	...	...	...	...	33	60
Sovereign ...	P1704	...	...	...	...	...	...	65	...	65	65
Steinwedel ...	P 50	47	67	32	...	...	...	...	...	49	67
Sterling	P1712	...	...	...	...	...	77	79	...	78	79
Sultan	P1199	...	...	34	73	47	75	...	...	57	75
Sunset	P 675	...	...	30	58	...	...	...	...	44	58
Suvla	P1699	...	...	...	...	...	...	16	...	16	16
Teakles	P 873	30	...	27	75	28	...	...	...	40	75
Thew	P 217	0	49	3	...	...	...	...	...	17	49
Toby's Tusk ...	P 920	0	91	42	...	...	...	...	...	44	91
Triumph	P1382	...	...	...	...	60	...	...	...	60	60
Turvey	P 257	43	65	38	70	51	81	...	...	58	81
Union	P1777	...	...	...	...	...	...	42	...	42	42
Viceroy	P1711	...	...	...	...	...	58	...	...	58	58
Wallace	P1383	...	...	...	...	...	...	...	90	90	90
Wandilla	P1182	...	...	...	...	21	...	78	...	50	78
Wannon	P1637	...	...	...	...	17	59	...	...	38	59
Waratah	P1627	...	...	...	...	23	69	53	87	68	87
Warden	P1274	...	12	74	35	...	...	...	...	40	74
Wardfir	P1756	...	...	...	...	...	...	17	...	17	17
Warren	P 153	...	...	12	62	11	...	...	...	28	62
White Tuscan ...	P1516	...	...	...	...	...	...	...	92	92	92
Wilfred	P1037	13	88	26	54	45	70	...	...	49	88
Yandilla	P 392	...	...	...	...	...	...	...	58	58	58
Yandilla King ...	P 226	16	63	27	58	35	58	...	...	43	63
Yanward	P 984	...	...	...	...	...	...	...	71	71	71
Yetna (C79) ...	P1801	...	...	...	...	...	...	7	45	26	45
Yuna	P1439	...	69	27	...	...	...	...	...	48	69

TABLE V.

BUNT RESISTANCE TESTS—1921 to 1928.

Varieties arranged according to the highest Percentage of Infection recorded during tests.

Resistant—0 to 25% infection.		Susceptible—From 26% to 75% infection.				Very Susceptible—From 76% to 100% infection.			
	%		%		%		%		%
Genoa	0	Danno	27	Bruce	57	Hard Federation	67	Cuballing	76
Sarragolla	1	Marmora	27	Early Bird	57	Steinwedel	67	Nugget	76
Dindiloa	2	Krithia	28	Noongaar	57	Merredin	68	Patriot	76
Covelle	3	Felix	29	Bunyip	58	Noble's Early	68	Amby	77
Kubanka	3	Minyip	31	Carrabin	58	Yuna	69	Emperor	77
Ford	4	Geralying	34	Fortune	58	Gluyas Late	70	Onas	77
Piastre	4	Boolaroo	35	Sunset	58	Nolba	70	Golden Return	78
Florence	10	Mahratta	35	Viceroy	58	Red Russian	70	Wandilla	78
Huguenot	10	Sepoy	38	Yandilla	58	Bena	71	Comeback	79
Suyla	16	Bald Knob	40	Wannon	59	Bowes	71	Confederation	79
S.H.J.	17	Nabob	40	Nabawa	60	Majestic	71	Sterling	79
Wardfir	17	Riverina	42	Ogilvie	60	President	71	Daphne	80
Minister	22	Union	42	Soutars Early	60	Yanward	71	Dollar	80
Indcret	23	Duri	43	Triumph	60	Belka	72	Firbank	80
Dookie Delta	24	Aussie	45	Indian Pusa 4	61	Gallipoli	72	Canaan	81
Minflor	24	Ghurka	45	Rajah (S. Aust.)	62	Major	72	Clarendon	81
		Yetna	45	Warren	62	Ranee	72	Currimp	81
		Thew	49	Rajah (Vic.)	63	Anvil	73	Hamel	81
		Boonoo	50	Yandilla King	63	Fane	73	Nungarin	81
		Nizam	51	Early Baroota Wonder	64	Gluyas Early	73	Parsee	81
		Queen Fan	51	Sailors Fortune	64	Cadia	74	Turvey	81
		Exquisite	52	Alliance	65	Capitol	74	Queen's Jubilee	83
		Babakin	53	Austan	65	Federation	74	Barwang	84
		Bobin	53	Binya	65	Mac's White	74	Gluclub (Vic.)	84
		Cargo	53	Lotts	65	Warden	74	Booran	85
		Omrah	54	Sovereign	65	Currawa	75	Gresley	86
		Empire	55	Bayah	66	Sultan	75	Avoca	87
		Bredbo	56	Roseworthy	66	Teakle	75	Lilydale	87
		Canimbla	56	Gluclub (W.A.)	67			Mogul	87

	%
Nullah	87
Waratah	87
Bathurst	88
Golden King	88
Newmans Early	88
Wilfred	88
Austral	89
Bald Early	89
Clubhead	89
Nangeenan	89
Canberra	90
Cumberland	90
Niloc	90
Wallace	90
Toby's Tusk	91
Leaks Rustproof	92
White Tuscan	92
Caliph	93
Cleveland	93
Alpha	96
Bunge No. 1	96
Hiawatha	96

VARIATION IN THE RESISTANCE OF LINES (OR STRAINS) OF TWO STANDARD VARIETIES.

This test was first carried out in 1927 with the varieties "Nabawa" (P. 1432) and "Carrabin" (P. 1437) to observe the variation in the resistance of different strains or lines of an apparently fixed variety. The results published in the "Journal" for September, 1928, showed that there is a wide range of variation between the strains—pointing to a possibility of improvement by selection.

With "Nabawa," the infection from 25% to 64% was considered too high to continue the test, and it was decided to concentrate on the variety "Carrabin." This variety only shows infection in late growth, and was at one time considered resistant. It is thought, therefore, that a resistant strain may be obtained by selection.

"Noongaar" (P. 1769) was also tested this season, but the infection was too high and the test will not be continued.

The results are as under:—

Percentage of Infection found in Two Pure Line Varieties.

TABLE VI.

Family.	Line.	Carrabin. (P. 1437).	Noongaar. (P. 1769).
		%	%
I.	a	18	52
II.	a	8	71
III.	a	8	45
I.	b	19	47
II.	b	19	41
III.	b	22	49
I.	c	5	56
II.	c	13	57
III.	c	20	55
I.	d	9	57
II.	d	10	69
III.	d	30	59
I.	e	15	67
II.	e	26	62
III.	e	17	62
Average percentage of infection per Line	...	15	57
		%	%
Percentage of Infection per Family		Family I. 12 Family II. 14 Family III. 19	Family I. 54 Family II. 63 Family III. 54

EXPERIMENTAL PLOTS.

RESULTS OF TOP-DRESSING, 1927.

District.	No Manure.			1 cwt. Super. per Acre.			2cwt. Super. per Acre.			Rainfall during Growing Period.	Remarks.
	Weight of Growth per Acre.	Percentage Yield of Growth.	Percentage of Clover.	Weight of Growth per Acre.	Percentage Yield of Growth.	Percentage of Clover.	Weight of Growth per Acre.	Percentage Yield of Growth.	Percentage of Clover.		
GREAT SOUTHERN LINE.	cwt.	%	%	cwt.	%	%	cwt.	%	%	inches.	
Gnowangerup	...	100	*Nil*	...	124	10	...	132	3	1,067	Weight per acre not stated.
Kojonup	...	100	33	...	225	60	...	225	72	1,643	do. do.
Mt. Barker...	...	100	38	...	385	60	...	393	64	1,930	do. do.
Tambellup	72·00	100	55	194·40	270	76	223·20	310	81	1,287	
Wickepin	...	100	*Nil*	...	134	*Nil*	...	170	*Nil*	1,068	Weight per acre not stated.
SOUTH-WESTERN LINE.											
Harvey	43·20	100	9	50·40	118	57	64·80	150	78	3,672	
Kulikup	42·80	100	75	129·40	260	84	145·80	295	87	1,932	
Busselton	14·25	100	7½	39·50	277	54	53·00	372	25	2,923	
MIDLAND LINE.											
Gingin	...	100	14	...	218	22	...	348	32	2,422	Weight per acre not stated.
Greenough	112·00	100	54	146·00	130	47	172·00	154	43	1,517	
Mingenew	64·00	100	1	140·00	219	15	194·00	303	31	1,386	
Northampton	132·00	100	2	308·00	233	14	428·00	324	16	1,819	
Three Springs	86·00	100	6	334·00	388	42	346·00	402	44	1,165	
EASTERN LINE.											
Goomalling	7·20	100	60	9·40	130	23	8·60	120	58	...	

Perth, 1st March, 1928.

Katanning, Dongarra, and Toodyay—Eaten off by Stock.

RESULTS OF TOP DRESSING, 1928.

GREAT SOUTHERN LINE.	cwt.	%	%	cwt.	%	%	cwt.	%	%	inches.	
Gnowangerup	23·14	100	10	38·58	167	33	38·58	167	33	12·22	
Tambellup	36·00	100	14	87·42	243	47	129·86	361	46	14·67	
SOUTH-WESTERN LINE.											
Harvey	50·40	100	23	118·80	236	68	158·40	314	75	36·12	
Pinjarra	52·80	100	30	110·40	209	90	148·80	282	50	33·98	
Coolup	291·60	100	85	316·80	108	85	356·40	122	85	33·98	
MIDLAND LINE.											
Gingin	Not taken	100	9	Not taken	219	78	Not taken	316	71	28·04	
Greenough	144·00	100	33	224·00	156	48	244·00	169	51	17·68	
Mingenew	82·00	100	2	176 00	215	20	224·00	273	39	14·20	
Boscabel	5·14	100	Trace	46·28	900	61	110·58	2	87	20·53	
Three Springs ...	68·00	100	11	234·00	344	45	212·00	312	46	12·94	
EASTERN LINE.											
Goomalling...	65·24	100	55	102·86	1·5	55	123·42	186	65	11·51	

Perth, 14th February, 1929.

METEOROLOGICAL INFORMATION.

STATIONS.	TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.	
	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum		For Month.	Average.
	Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.		
	DECEMBER, 1928.						JANUARY, 1929.						FEBRUARY, 1929.					
					inches.	inches.					inches.	inches.					inches.	inches.
Chapman Farm ... State	87·7	110·5	60·7	49·6	·07	·25	95·0	111·3	62·9	53·8	*Nil*	·28	89·4	110·0	63·1	51·6	·49	·52
Geraldton	79·8	103·0	64·1	56·6	·37	·15	83·4	108·6	63·7	50·4	*Nil*	·22	84·1	108·0	66·4	54·0	·51	·30
Walebing	89·1	107·0	57·9	44·3	1·16	·46	91·4	109·8	59·8	51·0	·77	·34	90·4	107·0	63·3	48·5	2·23	·47
Perth	81·1	100·6	61·4	53·2	1·12	·56	84·1	99·8	61·5	50·7	·30	·34	84·8	104·3	64·6	50·4	·43	·45
Kalamunda	82·7	102·5	58·4	49·0	·57	·79	85·2	100·3	57·9	47·0	·83	·54	85·9	101·8	62·4	49·9	·69	·72
Bunbury	80·0	91·5	57·6	51·4	·60	·60	81·0	94·8	56·1	45·2	·07	·45	82·5	102·8	62·7	46·2	·52	·57
Bridgetown	84·8	103·8	49·9	40·0	·66	·78	87·4	102·0	48·8	34·8	·05	·54	87·5	105·0	54·9	42·0	1·73	·66
Albany	70·8	82·4	56·9	47·0	·91	1·15	71·5	82·4	57·4	50·4	·41	·83	72·5	87·0	59·6	52·4	1·20	·96
Merredin Farm State	89·9	107·8	60·6	43·6	·24	·60	90·8	106·0	59·3	46·9	·50	·58	89·7	167·2	63·9	46·8	1·62	·53
Northam	90·0	109·3	59·8	47·1	·76	·35	92·3	107·0	60·7	51·5	·05	·29	...	...	...	...	...	...
York	89·1	110·0	58·8	45·0	·28	·44	91·4	106·0	55·1	45·0	·12	·32	90·5	104·0	59·2	42·0	·52	·47
Narrogin Farm State	85·6	105·5	53·7	41·5	·53	·63	87·0	101·5	52·1	41·6	·37	·34	86·2	99·3	56·4	41·0	·89	·58
Katanning	85·3	103·7	55·0	43·0	·15	·62	86·2	101·6	53·3	45·3	·20	·37	86·8	102·0	57·3	47·3	1·42	·57
Cape Leeuwin ...	71·2	78·0	59·4	52·0	·70	·87	71·5	78·0	60·2	55·0	·08	·69	72·6	86·0	66·2	55·2	1·04	·89

MARKET REPORT.

Messrs. H. J. Wigmore & Co., Ltd., of 613-619 Wellington Street, Perth, have supplied us with the following information regarding chaff available at the metropolitan chaff and grain auction sales held in Perth for the period December, 1928, to February, 1929 (inclusive). In all cases the prices quoted are for f.a.q. to prime wheaten chaff, packed in new bags.

December—

Quantity, 1,300 tons.
Maximum, £6 per ton.
Minimum, £5 10s. per ton.

January—

Quantity, 850 tons.
Maximum, £6 10s. per ton.
Minimum, £6 per ton.

February—

Quantity—1,450 tons.
Maximum, £6 10s. per ton.
Minimum, £5 15s. per ton.

Owing to the shortage of trucks in January, the market advanced to £6 10s. per ton, but as trucks became available at the beginning of February, values eased to £5 15s. However, a truck shortage was again experienced at the latter end of February, and the market advanced to £6 10s., the following being closing quotations:—

F.a.q. to prime—£6 to £6 5s. per ton.
F.a.q.—£5 15s. to £5 17s. 6d. per ton.
Mediums—£5 to £5 5s. per ton.

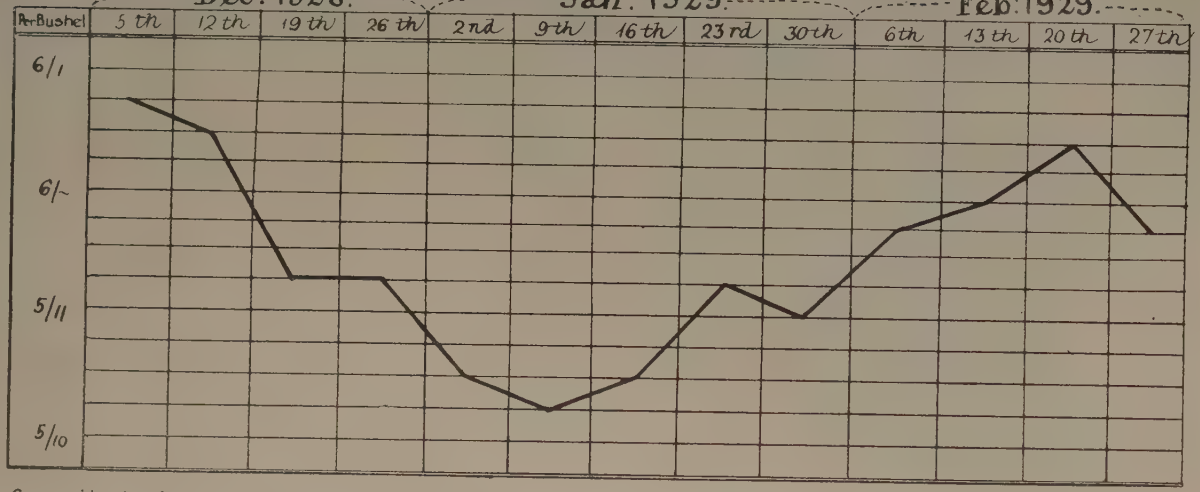
Oaten Chaff.—Right throughout December and January there was a demand for prime green samples at around £5 15s. to £6 per ton, but during February the market eased, prime quality selling at from £5 5s. to £5 10s.; mediums, as low as £4 10s.

Oats.—Supplies arriving have been sufficient to meet the demand, there being an inquiry for good heavy feed, Algerians and Guyras, at around 3s. to 3s. 3d. per bushel; light feeds, 2s. 4d. to 2s. 8d.

Wheat.—The local market is steady at from 4s. 10d. to 5s. per bushel; quality approaching this, 4s. 6d. to 4s. 8d.; inferior, lower.

Return of Wheat Prices Per Bushel

C.I.F & E. LONDON



Compiled from figures kindly supplied by the Co-operative Wheat Pool of West. Aust..

PRODUCERS' MARKET REPORT.

The Producers' Markets, Limited, report as under for quarter ended 28th February, 1929:—

FRUIT.

At the beginning of the period supplies of fruit were steady but very short for the demand, accountable, no doubt, to the fact that the early apricot crop was very short and in some districts a failure. Values for apricots up to Christmas sales were high, touching 37s. per three-quarter bushel case for good carrying lines. Although early peaches were very poor in colour, values were firm. Valencia oranges sold also to a keen demand in this period, with lemons on the improve. Yates apples, ex cool store, were in keen demand. Cherries were also very firm throughout the first month, and strawberries steady. Tomatoes were unsteady, only carrying lines in demand. In the second month new season apples came forward, which was a welcome addition to the shortage of supplies. Plums also increased in volume, Santa Rosa variety being a popular line with buyers. Peaches and apricots continued short. Grape growers commenced operating about this time with early varieties, selling at satisfactory values. Tomato supplies increased with values on the down grade. The last month of the quarter showed many changes in the variety of fruit. Apples were very heavily supplied with mostly inferior lines, and rejects from export having a telling effect on values. A few well-coloured lines sold at fair values, considering the quantity of apples forward, but other lines were very low and hard to quit. Grapes of all varieties forward with the demand steady for good quality fruit. Tomatoes also very heavy with some lines unsaleable. Bartlett pears also added to the variety, the demand being steady.

VEGETABLES.

Supplies have been heavy during the period. Potatoes were heavy and values easy, but supplies have fallen off now, and values have firmed. Metropolitan lines are just about finished, and growers are realising high prices for the end of their crop. Country potatoes are not yet plentiful, and values are firm for any lines showing quality. Pumpkin is plentiful, and inferior lines hard to quit. Cabbage has been heavily supplied during the period, and values low. It has been an exceptional year for cabbage, and the crop has been heavy. Some of the Balcatta growers are nearing the end of their crops and values should improve. Beans have shortened in supply during the last month, and values are now very firm. Peas continued to come in in short supply, and values are steady. Brown onions are fairly plentiful, a proportion of them being second grade, and this makes the market appear erratic. Prime lines are selling well. Some prime lines of celery are now

coming forward, and values are firm for all prime lines. Cucumbers have been heavily supplied during the latter part of the month, and the demand was brisk during the hot spell. Bunch lines are shortening, but the demand has been easy. Cauliflowers are now starting to come forward, and the quality is very good for this time of the year. Values are firm. Water and rock melons have been plentiful, but values suffered considerably on account of the scare. Lettuce is well supplied, and good quality lines are firm.

EGGS.

Supplies were very heavy in the beginning of the quarter and values were low, although Western Australia was realising better prices than the other States. However, supplies are now on the decline, and in consequence market values are advancing. Export has been very disappointing this season.

POULTRY.

Good supplies have been available, but the quality has not been as good as could be desired. Owing to the hot weather this month values did not reach as high as those of last month. At present turkeys are well sought after, but are very hard to get.

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